

PORSF
11-3.15.1-3



USEPA SF



1315600

CRAW00004816

The diesel tank was constructed of mild-steel and also showed moderate corrosion. As with the acetone tank, it showed not evidence that the corrosion had penetrated the tank to cause a leak. Its dimensions were 16 feet long by 3.5 feet in diameter. This equates to an approximate volume of 1150 gallons. The tank also was rolled such that the bottom could be inspected. No obvious holes were observed in the tank. Photos at the end of this report (Appendix E) document the condition of this tank.

After soil samples were obtained, the pits were refilled and the tanks were removed from the site and scrapped. The pits were refilled as a safety precaution because they were located near a parking lot and the fluvial deposits constituting the pit walls was prone to caving.

VII. Description of Subsurface Conditions in Tank Pits and Soil Samples Taken from Each Pit

Upon excavation, the soils were uniform, cross-bedded sandy silt and showed no visual evidence or odor to indicate that leaks or spillage had occurred during the operation of either tank. The photos in Appendix D document the condition of the pit walls and soils beneath the tanks. The soils were unconsolidated and unsaturated to the depth of excavation.

Samples of the subsurface material were taken from under the tanks on the day the tanks were removed. A sample was taken from directly under the middle of the acetone tank's bottom. Two samples were taken from directly under the diesel tank's bottom. One sample was taken at the middle point of the tank and the other was taken from under the fill end. Samples were immediately placed in an ice chest and transported to the laboratory.

VIII. Results from an Analysis of Soil Samples

Appendix C presents the results from an analysis of the three soil samples

collected. They were analyzed by Pacific Environmental Laboratory (PEL), Beaverton, OR. The two samples from the diesel tank pit were analyzed for total petroleum hydrocarbons using EPA Analytical Procedure 418.1. The acetone sample was analyzed for acetone using the Modified EPA Analytical Procedure 3810 for gas chromatography/mass spectrometry instruments.

The samples from the acetone pit did not contain detectable acetone (<0.2 ppm). The samples from the diesel tank pit contained 100 ppm total petroleum hydrocarbons from the tank's mid-point sample and 190 ppm from the tank's fill end sample. A contamination level of 100-190 ppm is relatively low and is likely due to minor surface spillage that subsequently had been washed into the subsurface by precipitation. Surface spillage is common during normal fueling operations and diesel fuel, being less volatile than gasoline, can persist in the soils whereas gasoline or acetone would be more prone to evaporate.

Because the fill end of the diesel tank showed nearly twice the contamination of the mid-tank sample, it is expected that minor overfilling contributed to the contamination detected. This tank had been in place since the mid-fourties. Given its long history of use, and thus its greater potential for causing high levels of contamination, the level of contamination observed was considered to be minor and very localized.

The analytical results are consistent with the field observations. No odors were detected in the soils during excavation or sampling. No visual evidence for contamination was observed. A diesel contamination level of 100-190 ppm apparently is too low to be observed visually or by odor.

The one sample taken beneath the acetone tank and two samples taken beneath the diesel tank are not adequate to rule out the possibility that more extensive contamination exists at this site. However, serious, widespread contamination is considered unlikely given the general field observations of no observable contamination (visual or odor).

The DEQ "Matrix" (Numeric Soil Cleanup Levels for Motor Fuel and Heating Oil, OAR 340-122-305 to OAR 340-122-360, August 1989) was not in effect when the oil tank was removed. However, a matrix calculation for the site follows:

Numeric values for the five evaluation parameters were assigned to the site as follows:

| | | |
|----------------------------|-------------------|-----------------|
| Depth to Ground water: | <25 feet | Score: 10 |
| Mean Annual Precipitation: | 37 inches | Score: 5 |
| Native Soil Type: | silty sands | Score: 10 |
| Upper Aquifer Sensitivity | potable, not used | Score: 4 |
| Potential Receptors | far/few | <u>Score:</u> 1 |
| TOTAL | | 30 |

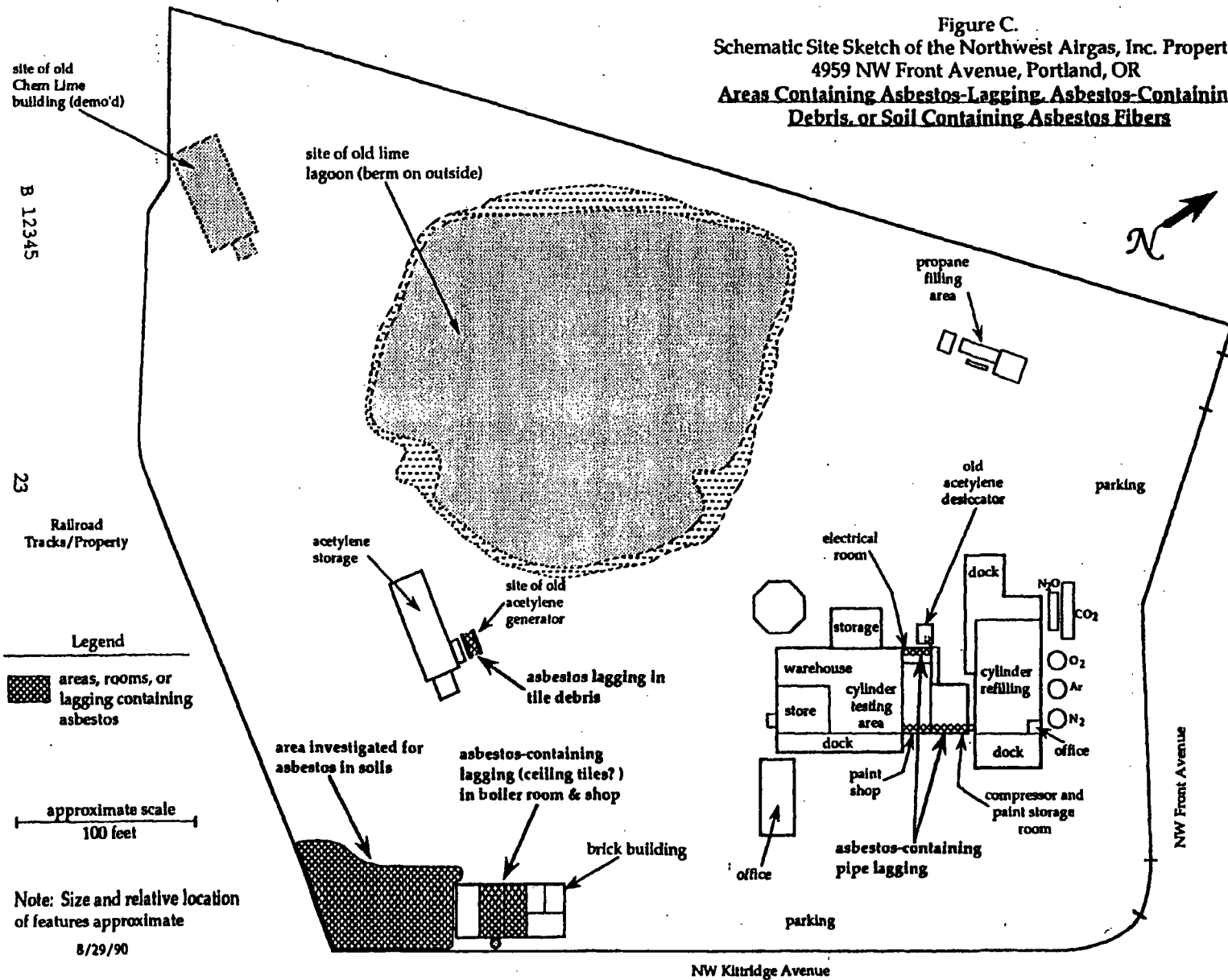
A total score of 25-40 classifies this site as requiring Level 2 cleanup standards. Level 2 cleanup standards for diesel are 500 ppm. Therefore the level of contamination found beneath the diesel tank was well below the DEQ cleanup standard.

→ Lime Sludge Characterization and Removal. Considerable effort has gone into the characterization and removal of the residual lime sludge in the sludge lagoon during 1989. Below is a summary of that activity.

The plant at this site started producing acetylene gas for industrial sales after it was built in 1942. Gas production was terminated during 1985. As mentioned previously the ownership was changed from Airco to NWAG in 1987. The acetylene generation method used was the reaction of calcium carbide (CaC_2) with water to produce acetylene gas (C_2H_2) and calcium hydroxide ($\text{Ca}(\text{OH})_2$). Calcium hydroxide is also known as slaked lime. The acetylene produced was dissolved in acetone and stored in acetylene bottles for sale. The calcium hydroxide was a by-product.

Lime produced by this plant was stored in above-ground metal tanks until sold. When the capacity of the tanks was exceeded, the additional material was stored in a lagoon measuring approximately 220' X 150' X 4' deep. A berm was built around the

Figure C.
Schematic Site Sketch of the Northwest Airgas, Inc. Property,
4959 NW Front Avenue, Portland, OR
**Areas Containing Asbestos-Lagging, Asbestos-Containing
Debris, or Soil Containing Asbestos Fibers**





Summary Report
for an Environmental Site Assessment and
Remediation of Property Located at
4959 NW Front Avenue, Portland, OR
prepared for
Northwest Airgas, Inc.

24 January 1991

B 12199

CRAW00004821

**CRAWFORD STREET CORPORATION
CSM Site Summary**

CRAWFORD STREET CORPORATION

Oregon DEQ ECSI #: 2363

8424 N Crawford St.

DEQ Site Mgr: Tom Gainer

Latitude: 45.5855°

Longitude: -122.7564°

Township/Range/Section: 1N/1W/12

River Mile: 6.5 West bank

LWG Member ☐ Yes ☒ NoUpland Analytical Data Status: ☐ Electronic Data Available ☒ Hardcopies only**1. SUMMARY OF POTENTIAL CONTAMINANT TRANSPORT PATHWAYS TO THE RIVER**

The current understanding of the transport mechanism of contaminants from the uplands portions of the Crawford Street Corporation (CSC) site to the river is summarized in this section and Table 1, and supported in following sections.

1.1. Overland Transport

The occurrence of overland transport in the southern portion of the site is evidenced by erosional gullies present on the riverbank, including in areas of the former black sand fill material that is an identified historical contaminant source.

1.2. Riverbank Erosion

The black sand fill material historically placed along the top of the riverbank was apparently transported to the beach fronting the property and into the Willamette River by riverbank erosion (DEQ 2004). Other site sources that may include complete contaminant migration to the river via bank erosion include the metal debris pile present on the beach and the abandoned outfall pipes along the riverbank.

1.3. Groundwater

Contaminants of interest were not detected in representative groundwater samples collected from three monitoring wells located near the Willamette River (Bridgewater 2002b). For this site, groundwater does not appear to be a migration pathway for contaminants to the Willamette River (DEQ 2004) (see Section 10.2).

1.4. Direct Discharge (Overwater Activities and Stormwater/Wastewater Systems)

The CSC site includes no current dock structures or functioning private outfalls. Stormwater systems present on the northern portion of the site drain to municipal stormwater sewers or to a recently installed sand filter/retention box located south of a central operations yard near the Union Pacific Railroad (UPRR) railroad right-of-way. Historically, drainage from the operations yard discharged directly to the ground surface near the right-of-way. Limited sampling has been conducted onsite to determine the extent of possible site contributions to runoff in the northern portion of the property.

DO NOT QUOTE OR CITE

This document is currently under review by US EPA and its federal, state, and tribal partners, and is subject to change in whole or in part

Stormwater on the southern portion of the site infiltrates the unpaved ground surface or drains to the shoreline through localized erosional gullies. Dock structures were historically present at the site, though details of overwater activities are unknown. Several abandoned pipes were located along the shoreline, the purposes of which are unknown. These pipes were not observed carrying flow or discharge and are likely related to historical usage (Bridgewater 2001, pers. comm.). Stormwater from the former black sand deposits along the riverbank and shoreline, a metal debris pile on the beach, and abandoned outfalls along the shoreline may serve as a transport pathway for contaminants associated with these potential sources (see Section 10.3).

1.5. Relationship of Upland Sources to River Sediments

See Final CSM Update.

1.6. Sediment Transport

The Crawford Street property is located along the east bank of the lower Willamette at approximately RM 6.3 and within the narrow river reach (RM 5-7) that is characterized as a transport/non-depositional zone in the Programmatic Work Plan (Integral et al. 2004). There is a relatively gently sloping, shallow-water bench that extends outward from the uplands to the 0 NAVD88 contour. From there, the bottom slopes more steeply to channel depth. The Sediment Trend Analysis® indicates that dynamic equilibrium transport paths dominate in this portion of the river. The time-series bathymetric change data over the 25-month period from January 2002 through February 2004 (Integral and DEA 2004) indicate that a swath between the -0 and -20 foot NAVD88 contours is dominated by sediment scour up to 1+ foot in extent. Below the -20 foot NAVD88 contour and out across the channel, the riverbed is a mosaic of small-scale erosion and no change areas. Very little sediment accretion is evident in this segment of the river. No bathymetric change data are available for nearshore areas above the 0 contour due to limited survey vessel.

2. CSM SITE SUMMARY REVISIONS

Date of Last Revision: March 4, 2005

3. PROJECT STATUS

| Activity | Date(s)/Comments |
|-------------------------------|---|
| PA/XPA | <input checked="" type="checkbox"/> XPA performed by Bridgewater (2000/2002b) |
| RI | <input type="checkbox"/> |
| FS | <input type="checkbox"/> |
| Interim Action/Source Control | <input checked="" type="checkbox"/> Black sand removal action (Bridgewater 2002a) |
| ROD | <input type="checkbox"/> |
| RD/RA | <input type="checkbox"/> |
| NFA | <input type="checkbox"/> |

DEQ Portland Harbor Site Ranking (Tier 1, 2, or 3): Tier 1

DO NOT QUOTE OR CITE

This document is currently under review by US EPA and its federal, state, and tribal partners, and is subject to change in whole or in part

4. SITE OWNER HISTORY

Sources: Multnomah County Taxation records, Polk City of Portland directories, Sanborn fire insurance maps, USACE Port Series reports, Bridgewater 2000, CFMW 1999, pers. comm., SE/E 1988.

| Owner/Occupant | Type of Operation | Years |
|--|--|---------------------------------------|
| Crawford Street Corporation - owner* | | Portions from 1971-; 1988-present |
| Lampros Steel - operator | Structural steel recycling and distribution | 1989 - present |
| TLS Steel Products, Inc. - operator | Small forging and fabricated steel business | 1989 - ~1999 |
| Manufacturing Management Incorporated - owner | Unknown | 1988 |
| Asset Recovery | Unknown | ~1987? |
| St. Johns Forge & Iron - operator | Unknown | ~1986/1987 |
| Silco Construction Co. - operator | Unknown | ~1986/1987 |
| Columbia Forge and Machine Works, Inc. - operator | Metal forging and stamping products | 1971- present |
| City of Portland, Portland Development Commission - owner | Unknown | 1970s - 1988 |
| Peninsula Pattern Works - operator | Unknown | ~1960 - ? |
| Plylock Corp. (formerly Portland Manufacturing Co.) - operator | Wood manufacturing | 1950s |
| Union Pacific Railroad Co. - operator | Unknown | ~1950 - ? |
| Portland Chain Manufacturing - operator | Chain manufacturing and warehouse | ~1944 - ? |
| St. Johns Dock - owner/operator | Machine shop | 1935 - ? |
| Portland Spruce Mills - operator | Lumber transfer | 1932 - ? |
| Portland Woolen Mills - operator | Wool grading and baling warehouse | 1932 - ~1948 |
| Skookum Logging Supply Co. - owner/operator | Logging machinery manufacturing, foundries and forges | 1924 - 1971 |
| St. Johns Planing Mill - operator | Lumber and saw mill | ~1920 - ? |
| St. Johns Fuel Co. - operator | Unknown | ~1920 - ~1950s |
| Pacific Stove & Range Manufacturing Co. - operator | Stove and range manufacturing | 1911 - ? |
| Central Lumber Co. - operator | Lumber - logway, saw mill, boilers | 1905 - ? |
| Cone Brothers - operator | Unknown - wharf and smokestack | 1905 - ? |
| Portland Lumber Mill (Div. of Portland Manufacturing Co.)/Portland Lumber Mills (Div. of Brand-S Corp.) - operator | Veneer manufacturing | 1905 - ? facility demolished in 1970s |
| Portland Steel Ship Building Co. - operator | Specifics unknown | 1905 - at least 1925 |
| St. Johns Lumber Company - operator | Lumber - sorting, transfer, planing mill, saw mill, kiln | 1905 - ? |
| St. Johns Machine Shop - operator | Machine shop | 1905 - ? |

*Site records indicate Schnitzer Investment Corp and/or Schnitzer Steel Industries was an owner in 2001-2002; no specific ownership information is available (DEQ 2001, pers. comm.; 2002, pers. comm.; EPA 2001). Other potential owners and operators are listed without years of operation in Section 7.

DO NOT QUOTE OR CITE

This document is currently under review by US EPA and its federal, state, and tribal partners, and is subject to change in whole or in part

5. PROPERTY DESCRIPTION

The Crawford Street Corporation (CSC) site is located on approximately 15 acres of land in an industrial area of the St. John's district of northern Portland (Bridgewater 2000, 2002a; DEQ 1999). The site includes the current addresses of 8424 and 8524 North Crawford Street. It is bordered by North Crawford Street to the north, North Burlington Avenue to the west, North Richmond Street to the east, and the Willamette River to the south (CFMW 1999, pers. comm.; Bridgewater 2002a). A heavy equipment/truck repair company is located across Crawford Street to the north of the site (CFMW 1999, pers. comm.). A residence, auto repair shop, and vacant property are located to the east of the site across North Richmond Street (Bridgewater 2000). The City of Portland Bureau of Environmental Services (BES) laboratory (ECSI #2452) is located across North Burlington Avenue, southwest of the site, and the western parcel of the Willamette Cove site (ECSI #2066) is located across North Richmond Street to the east (Figure 1).

The CSC property is bisected by a UPRR right-of-way (CFMW 1999, pers. comm.; DEQ 1999). Except for the building footprints, the site is entirely fenced (CFMW 1999, pers. comm.). Portions of the property, including the northeastern vacant parcel, portions of the CFMW facility, and the entire southern half of the property (south of the railroad spur), are unpaved (Bridgewater 2000).

The site is located above the 100-year floodplain, at approximately 40 feet above sea level. The 1996 record flood on the Willamette River did not exceed the top of the bank along the property. The surface is relatively flat except for the riverbank, although the general vicinity north of the site slopes down steeply toward the site. The riverbank is vegetated with small trees and blackberries, and is largely covered with logs and large pieces of debris. Several 8- to 10-inch pipes have been observed protruding from the riverbank; no flow or evidence of flow was observed. The pipes are likely associated with historical site usage (Bridgewater 2000; 2001, pers. comm.).

Storm drain lines at the site are located along North Crawford Street, and along the UPRR spur [see Supplemental Figure 2-1 of Bridgewater (2000)]. Roof drains from site buildings drain directly to the storm drain line buried along the railroad tracks. Most of the runoff from the site flows to two catch basins located north of the intersection of the UPRR tracks and North Burlington Street. These catch basins also collect runoff from a large area north of the CSC site. During heavy rainfall, stormwater from upgradient sites (to the north) flows onto the CSC site. During extended rainfall periods, water ponds along the northern edge of the UPRR tracks, consisting of runoff from both the CSC and upgradient properties. This runoff may eventually enter the City of Portland (COP) catch basin on North Burlington Street, which discharges to the Willamette River through Outfall 52 west of the site. Prior to 1997, the discharge entered the river at Outfall 50. Runoff in the southern half of the site appears to infiltrate the bare ground; however, several small erosional draws were observed along the top of the riverbank that appear to drain localized areas through overland flow [see Supplemental Figure 1 from Bridgewater (2001, pers. comm.); Bridgewater 2000].

Information regarding the lease of submerged lands and/or overwater structures was not found in Oregon Department of State Lands files.

6. CURRENT SITE USE

Two companies operate at the site: Columbia Forge and Machine Works, Inc. (CFMW), and Lampros Steel, Inc. (Lampros) [see Supplemental Figure 2-1 of Bridgewater (2000)].

CFMW

CFMW has operated at the site since 1971, producing metal forging and stamping products (DEQ 1999). Their facility includes three buildings (approximately 27,000 square feet [sq. ft]) and two yards (approximately 30,000 sq. ft; CFMW 1999, pers. comm.; DEQ 1999). According to CFMW (1999, pers. comm.), stated uses of the facility buildings include:

DO NOT QUOTE OR CITE

This document is currently under review by US EPA and its federal, state, and tribal partners, and is subject to change in whole or in part

- Building 1: Manufacturing
- Building 2: Manufacturing and tool storage
- Building 3: Shipping, manufacturing, and warehousing
- Oil Storage Hut: Drum storage.

Additional site features are shown in Supplemental Figure 2-4 from Bridgewater (2000).

Building 1 was constructed in the mid-1950s, and the oil storage hut was constructed in 1972. Equipment used at the CFMW facility includes forges, lathes, and machining equipment (Building 1), steel cutting equipment, an air compressor, two parts washers (Building 2/3), upsetter forges, induction heaters, a drop forge, and welding equipment (operations yard). All forging and general operation areas at the CFMW facility are covered, although areas surrounding the forge pads in Building 1 consist of bare ground [see Supplemental Figure 2-4 from Bridgewater (2000)]. Small quantities of oil, lubricants, and aerosol cans of brake cleaner were observed stored in Building 2/3 (Bridgewater 2000).

Steel pieces are manufactured in the Central Yard (operations yard), and raw steel is stored in the other yard (CFMW 1999, pers. comm.). Several ASTs onsite store only compressed gases (oxygen, acetylene, propane). Oil, lubricants, degreasers, and non-halogenated petroleum solvent (naphtha) are used in CFMW operations, and are sent offsite for recycling and/or disposal (DEQ 1999). Chlorinated solvents have never been used at the CFMW facility. Used oil has been recycled offsite since at least the mid-1980s. CFMW also receives used oil from Lampros Steel for disposal through their licensed contractor (Bridgewater 2000).

CFMW (1999, pers. comm.) reports the following approximate amounts of chemicals used and wastes generated annually:

- Approximately 1,000-4,999 gallons of used oil (hydraulic and motor oils)
- 4 gallons of lubricants; a maximum of 49 gallons was stored onsite in 1998
- 0-4 gallons of degreaser; a maximum of 19 gallons was stored onsite in 1998
- Up to 72 cubic yards of solid waste material is generated and disposed of offsite
- Approximately 55 gallons of petroleum naphtha solvent is typically stored onsite, with approximately 53 gallons recycled by Safety Kleen.

Prior to disposal, used lubricants, oil, and degreasers are stored in a 1,000-square-foot covered containment area (Oil Storage Hut; CFMW 1999, pers. comm.). Approximately forty 55-gallon drums, primarily of lubricating oil, were observed in secondary containment units in the oil storage hut during the PA (Bridgewater 2000). The concrete floor of the storage hut appeared sound and includes no floor drains, but evidence of incidental drippage was observed (Bridgewater 2000). Used solvent is contained in two parts washers located in Building 3 that are routinely serviced by Safety Kleen (CFMW 1999, pers. comm.). CFMW is a registered RCRA conditionally exempt generator of hazardous waste (CEG; ID# ORD009022104) and appears to be in compliance as of 1999 (DEQ 1999).

A pad-mounted electrical transformer is located in the southwest portion of the operations yard [see Supplemental Figure 2-4 from Bridgewater (2000)]. No evidence of leakage from the transformer was observed during the PA.

The CFMW facility also includes an air compressor in the operations yard [see Supplemental Figure 2-4 from Bridgewater (2000)]. Oily staining was observed on the concrete pad of the compressed air tank located next to the air compressor [see Supplemental Figure 2-4 from Bridgewater (2000)]. Another air compressor was noted outside the east wall of Building 1 in 1988, which was said to generate oily blowdown water that discharged to the ground surface south of the compressor building [see Supplemental Figure 3 from SE/E (1988)]. No information on

DO NOT QUOTE OR CITE

This document is currently under review by US EPA and its federal, state, and tribal partners, and is subject to change in whole or in part

blowdown volumes or specific drainage routes were provided, but based on information in the PA, it is assumed that the blowdown effluent drained to unpaved ground and either infiltrated the ground or ran off to the general drainage area along the UPRR tracks [see Supplemental Figure 2-4 from Bridgewater (2000)].

Two stormwater catch basins are located in the operations yard: one near the northeastern corner of the drop forge, the other along the western edge of the yard north of the compressor building, south of a former paint storage room [see Supplemental Figure 2-4 from Bridgewater (2000)]. Yard runoff drains to these catch basins, then flows through underground piping to a sand filter/retention box that was installed in approximately 2000 at the southern boundary of the yard. After flowing through the retention box, the runoff infiltrates the ground next to the UPRR spur. Previous to the retention box installation, runoff from the yard would exit the drainpipes at the southern yard boundary and drain directly to the ground surface near the railroad spur. During the PA site visit, "significant" sheetflow was observed flowing from properties to the north of the site (particularly from the North John Street area) onto and across the CFMW/Lampros storage yard [east of Building 1; see Supplemental Figure 2-1 from Bridgewater (2000)]. CSC constructed an asphalt berm to the north of the CFMW operations yard [see Supplemental Figure 2-4 from Bridgewater (2000)] to prevent runoff from upgradient sites from entering the yard; prior to that, upgradient property runoff flowed into the yard and entered the yard catch basins.

Lampros

Lampros Steel has operated a structural steel distribution center at the site since 1989. Lampros facility operations include offloading trucks and railcars, bending and cutting steel (using saws), and loading trucks (Bridgewater 2000; DEQ 1999).

The Lampros facilities at the site include a covered 200-foot by 200-foot steel building located in the northeastern quarter of the site that extends from North Charleston Street to North John Street, east of the CFMW facility [see Supplemental Figure 2-1 from Bridgewater (2000)]. The building has a concrete floor (no floor drains) and is used for cutting steel beams. Small quantities of water-based lubricating oil are used in a beam saw located in the center of the building; oil and water-based cutting oil are stored in the building. Oil stains were observed on the floor beneath the cutting equipment. Water-based lubricants have been used by Lampros since they started operation at the site (Bridgewater 2000).

Used motor oil generated at the site is sent offsite for disposal/recycling (DEQ 1999). Three 55-gallon drums of hydraulic oil were observed in the Lampros building, along with two 55-gallon drums of water-based cutting oil, and one 55-gallon drum of used oil (Bridgewater 2000). Synthetic saw coolant is reused or recycled onsite (DEQ 1999). Scrap steel is recycled (FSM 2002). The Lampros facility includes one 1,000-gallon diesel aboveground storage tank (AST) with secondary containment (Bridgewater 2000; DEQ 1999). No spills from the tank were reported (Bridgewater 2000).

Lampros uses several portions of the CSC site for storage, including a vacant area at the northeastern corner of the site, extending from North Richmond Street to North Charleston Street. This area is primarily covered with vegetation, except for the interior portion that has been covered with gravel fill that is used by Lampros Steel for storage of their steel products. No evidence of hazardous materials release or spills was observed in this area (Bridgewater 2000).

The southern half of the site (south of the BNRR right-of-way) consists of approximately 7 acres of open area used by Lampros Steel as a storage and staging area for structural steel beams (Bridgewater 2000).

The ground surface along the UPRR tracks included areas of staining likely stemming from releases from diesel locomotives or other products from railcars (Bridgewater 2000).

DO NOT QUOTE OR CITE

This document is currently under review by US EPA and its federal, state, and tribal partners, and is subject to change in whole or in part

7. SITE USE HISTORY

A review of fire insurance maps indicates that the site was developed at least as far back as 1905. Past uses of the site shown by the maps include:

- **Northern Portion:** Included various small machine shops, foundries (including several associated with Skookum Logging Equipment), forges (associated with Skookum Logging Equipment and Portland Chain Manufacturing Company), lumber and log storage, a small auto repair shop (Love Fuel Company), storage of plywood and lumber mill wood waste, a box factory, a mercantile warehouse, and a "pattern shop" and coal bin (associated with Skookum Logging Equipment) on the northern portion of the site.
- **Southern Portion:** Included a lumber mill (Central Lumber Company), a foundry and machine shop (American Marine Iron Works), a plywood mill (Plylock Corporation), a "Woolen Mill" warehouse, various small machine shops, a planning mill (St. John's Lumber Company), lumber storage (for St. John's Lumber Company and Portland Lumber Company), and docks associated with sand and gravel staging on the southern portion of the site

SE/E (1988) also identified former Portland Steel Shipbuilding and Portland Stove and Range Manufacturing Co. usage of the northeastern parcel at the site. Past uses and locations of portions of the site are listed in Table 3 and Supplemental Figure 2 from SE/E (1988).

The former lumber and plywood mills on the southern portion of the site appear to have been fueled by sawdust. The American Marine Iron Works and Portland Chain Manufacturing Company foundries may have been fueled by coke stored onsite. American Marine Iron Works was located in the southern portion of the site, between North Richmond and North John Streets, and Portland Chain Manufacturing was located in the northwestern corner of the site, at the corner of North Crawford Street and North Burlington Avenue. Bridgewater (2000) noted no fuel tanks were shown associated with Love Fuel Company. CFMW occupied the former "pattern shop" building in 1971. Machine shops located on the northern portion of the site between North Richmond and North Leavitt streets were fueled by coal (Bridgewater 2000).

The current facility buildings were constructed between 1957 and 1963. Aerial photographs indicate that the southern portion of the site was largely covered by buildings with docks from at least 1936 through 1963; these structures appear to have been removed between 1963 and 1977 (DEQ 1999).

The City of Portland's Portland Development Commission (PDC) obtained most or all of the various parcels that make up the current CSC site in the 1970s and 1988, which were then sold to Manufacturing Management Incorporated (MMI) in 1988. MMI transferred these parcels to CSC shortly thereafter (by 1989; Bridgewater 2000). It was noted that when the MMI purchased the property in 1988, a drum of Silvex (an herbicide) was present in a PDC building that was located in the current Lampros storage building area (Bridgewater 2000).

A former building at the site was served by a septic tank and drain field [see Supplemental Figure 3-1 of Bridgewater (2000)]. This building had been used for wool scouring and plywood storage; the most recent tenant was "Fibron Insulation" (Fibron) during the 1970s to early 1980s before the building was demolished in 1986 (SE/E 1988). Fibron sold fiberglass insulation (Bridgewater 2000). No information has been found regarding Fibron's specific use of the site, whether for the manufacture, storage, and/or sales of their product.

Up to approximately 6 feet of black sand fill material was placed by previous property owners during the demolition of the former lumber mill building in 1977-1978 [see Supplemental Figure 3-1 of Bridgewater (2000); SE/E 1988]. The sand had reportedly been obtained from a local sandblasting company and previously had been used to clean land- and ship-based oil tanks (SE/E 1988). The sand appeared oily when placed on the site, and runoff from the area later created a "slick" or sheen on the Willamette River

DO NOT QUOTE OR CITE

This document is currently under review by US EPA and its federal, state, and tribal partners, and is subject to change in whole or in part

that eventually disappeared (SE/E 1988).

The CFMW facility Building 2/3 contains a former paint room [see Supplemental Figure 2-4 from Bridgewater (2000)]. No information regarding the types of paints associated with paint room is available. The former practice for cleaning the paint room had involved hosing the floor with water, which ran to a drain that led out to the southeastern corner of the building and discharged onto the ground just north of the railroad tracks (see Supplemental Figure 2-4 from Bridgewater 2000; SE/E 1988). The runoff included oil that penetrated the ground in an area approximately 10 feet wide by several tens of feet long. During periods of rainfall, oil was observed on the surface of the large runoff puddle that would typically form in the area of discharge (SE/E 1988).

TLS Steel Products, Inc. (TLS) formerly operated a small steel forging and fabrication facility in a portion of the CFMW Building 2/3 that they leased from 1989 to May 2000. Facility operations included light metal heating, cutting, punching, shaping, and bending, using a small natural gas furnace. Lubricating oil and water-based cutting oils were used in the fabrication machines and were stored in their area of the building. Petroleum staining was observed on the concrete floor of the TLS area, which included no floor drains. Used oil was accumulated at the CFMW facility and recycled offsite (Bridgewater 2000).

Four USTs formerly existed at the CSC site, as shown in Supplemental Figure 2-4 from Bridgewater (2000):

- One 1,000-gallon Bunker C UST that had been installed in Building 1 of the current CFMW facility in the late 1960s. This tank was removed in 1987
- One 1,000-gallon steel gasoline tank that had been installed in the current CFMW yard area in the mid-1950s. This tank was removed in 1987. The tank had been empty since 1960 (SE/E 1988). A small hole was observed at an unknown location on the tank (SE/E 1988).
- One 5,000-gallon steel diesel UST installed prior to 1960 west of the former TLS area on the CFMW facility. This tank was removed in 1987 (Bridgewater 2000).
- One 2,500-gallon oil tank discovered in 1988 in the southeastern portion of the site [see Supplemental Figure 3-1 from Bridgewater (2000)]. This tank was removed on January 18, 1988 (SE/E 1988).

The available results of soil samples collected following the removal of these tanks are summarized in Section 10.1.1 below.

8. CURRENT AND HISTORIC SOURCES AND COPCS

The understanding of the historic and current potential upland and overwater sources at the site is summarized in Table 1. The following sections provide a brief overview of the potential sources and COPCs at the site requiring additional discussion.

8.1. Uplands

Following discussions between DEQ and CSC, site sources identified for sampling associated with the PA included (Bridgewater 2002b):

- **Stormwater Runoff from Columbia Forge Yard:** Site runoff, including former "paint room" and former and current CFMW operations yard runoff, discharges to southwestern corner of the yard. From there, it is routed through a sand filter installed in 2000, then to the ground surface. During periods of high flow, the runoff may drain along the railroad tracks to the municipal storm sewer located at the western end of the site. The contaminants of interest (COIs) associated with the runoff were identified as PAHs, VOCs, and metals.

DO NOT QUOTE OR CITE

This document is currently under review by US EPA and its federal, state, and tribal partners, and is subject to change in whole or in part

- **Imported Black Sand Fill Material (a.k.a. "black sand"):** Sandblast material was placed on the riverbank as fill and over time has eroded onto the beach fronting the site and into the river (DEQ 2004). COIs identified for the black sand in the PA consisted of PAHs, lead, and mercury. Samples analyzed by Toxicity Characteristic Leaching Procedure (TCLP) during the 2001 removal action (see Section 11.1) resulted in leachable lead concentrations up to 4.73 mg/L, and leachable chromium up to 0.101 mg/L (Bridgewater 2002a). These results are below the 5 mg/L criteria that would designate the black sand as a hazardous waste (Bridgewater 2002a). Other COCs associated with the black sand include PCBs, diesel- and heavy-oil-range hydrocarbons, xylene, and zinc (see Sections 10.1.1 and 11.1.1 below; SE/E 1988; Bridgewater 2002b; Geiselbrecht 2002).

Based on information provided in the PA (Bridgewater 2000), additional potential contaminant source areas in the uplands portion of the CSC site may include:

- **Current Site Operations:** These operations include steel products manufacturing and equipment maintenance operations, which use lubrication and cutting oils, solvents, and diesel fuel. Releases from site equipment or storage areas may impact surface and subsurface media (Bridgewater 2000).
- **Former USTs:** Gasoline, diesel, and bunker C USTs [DEQ (1999) referred to the latter as a "used oil UST"] were removed from the site in 1987 and 1988.
- **Railroad Right-of-Way:** Oily surface staining was observed along the railroad, runoff from which drains to the Willamette River through municipal stormwater sewers.
- **Electrical Transformer:** One pad-mounted transformer onsite may contain PCBs.
- **Historical Facility Operations:** These operations included lumber, chain, and steel manufacturing; various mills (planing, plywood, lumber); woolen mill; various machine shops; auto repair; metal forging, cleaning, machining, shaping, cutting, and painting; possible shipbuilding-associated operations. Possible contaminants associated with these operations are unknown but may include lubricating and cutting oils, solvents, wood preservatives, and butyltins. Releases from these operations may have impacted surface and subsurface media, and may potentially have been transported through overland flow to the river (Bridgewater 2002a).

8.2. Overwater Activities

☒ Yes ☐ No

Based on information provided in the PA (Bridgewater 2000), the following potential contaminant source areas have been identified along the shoreline portion of the CSC site:

- **Imported Sandblast Fill Material (a.k.a. "black sand"):** Sandblast material placed as fill on the river eroded over time onto the beach fronting the site.
- **Historical Dock Operations (unknown):** Possible contaminants may include fuels and other petroleum products associated with possible releases from moored vessels, and possible wood preservatives used on dock pilings.
- **Outfalls:** Several unknown pipes were observed protruding from the riverbank at the site [see Supplemental Figure 2-1 from Bridgewater (2002b)]. The pipes were not observed to carry flow or drainage, and appear to have been associated with historic site usage. As presented in Section 10.1.1 below, contaminants associated with these outfalls include petroleum hydrocarbons, PAHs, and metals (Bridgewater 2002b).
- **Beach Metal Debris:** An area of degraded metal wire debris measuring approximately 300 square feet was present on the shoreline [see Supplemental Figure 2-1 from Bridgewater (2002b); Bridgewater 2001, pers. comm.].

DO NOT QUOTE OR CITE

This document is currently under review by US EPA and its federal, state, and tribal partners, and is subject to change in whole or in part

8.3. Spills

Known or documented spills at the Crawford Street Corporation site were obtained either from DEQ's Emergency Response Information System (ERIS) database for the period of 1995 to 2004, from oil and chemical spills recorded from 1982 to 2003 by the U.S. Coast Guard and the National Response Center's centralized federal database [see Appendix E of the Portland Harbor Work Plan (Integral et al. 2004)], from facility-specific technical reports, or from DEQ correspondence. No records of significant spills at the site were found.

A minor release (2 to 3 ounces) of PCB-containing oil was spilled in an electrical induction heater cabinet when a transformer capacitor overheated in May 1987 (CFMW 1999, pers. comm.; Bridgewater 2000). The spill was contained within the cabinet. The entire cabinet was removed and disposed of by General Electric. No PCB oil was released outside the cabinet.

TLS and CFMW reported several minor (<1 gallon) spills of motor, lubricating, or hydraulic oils from machinery onto concrete. The spills were reportedly cleaned up and did not impact soil or groundwater. Lampros claimed no spills had occurred on their property (DEQ 1999).

9. PHYSICAL SITE SETTING

The PA (Bridgewater 2000) and PA Soil and Groundwater Sampling Report (Bridgewater 2002b) were reviewed for geologic/hydrogeologic information for the site. The reports indicate that subsurface data were collected from test pits, investigative borings, and monitoring wells. The maximum depth explored was 40 feet bgs.

9.1. Geology

At least 12 test pits, 2 investigative borings, and 3 monitoring wells have been completed at the site. Based on available information, the site is underlain by recent fill and Quaternary alluvial deposits. The fill consists of predominantly sand with silts, clays, and gravels and extends to approximately 20 feet bgs. The Quaternary alluvial deposits consist of sand and silt. The base of the Quaternary alluvial deposits was not encountered during site investigations.

9.2. Hydrogeology

The depth to groundwater at the site was reported at approximately 29 feet bgs. Additional information regarding the groundwater gradient and flow direction at the site is not available in the reports reviewed for the site.

10. NATURE AND EXTENT (Current Understanding)

The current understanding of the nature and extent of contamination for the uplands portions of the site is summarized in this section. When no data exist for a specific medium, a notation is made.

10.1. Soil

10.1.1. Upland Soil Investigations

☒ Yes ☐ No

Soil samples were collected in association with the spill from the transformer in May 1987. The analytical results were sent to DEQ (CFMW 1999, pers. comm.) but are not available for this review.

Limited soil samples were collected during the UST removal activities conducted in 1987. Samples were collected from the excavations of the CFMW Bunker C and gasoline tanks and were analyzed for petroleum hydrocarbons; the soil sample from the gasoline tank ("yard tank") excavation was also analyzed for total and EP Toxicity lead. Bridgewater (2000) reports that diesel was not detected in either soil sample. Gasoline-range

DO NOT QUOTE OR CITE

This document is currently under review by US EPA and its federal, state, and tribal partners, and is subject to change in whole or in part

Page 10 of 21

hydrocarbons were detected from the yard tank excavation at 16 mg/kg (Bridgewater 2002a). Total lead was detected at 30 mg/kg (SE/E 1988). One soil sample was collected from the tank excavation following the removal of the former 5,000-gallon steel diesel UST in 1987. The sample was analyzed for petroleum hydrocarbons; gasoline or diesel was not detected (SE/E 1988).

Three soil samples were collected following the removal of the 2,500-gallon diesel tank on the southern portion of the property in 1988; two were collected from the bottom of the tank excavation, and one was collected from a stained area beneath a near-surface pipe near the southern corner of the excavation (SE/E 1988). Oil and grease were detected in the excavation-bottom samples, at 0.01 percent (equivalent to 100 mg/kg) and 0.02 percent (200 mg/kg). The sample from beneath the pipe contained an oil and grease concentration of 0.02 percent (200 mg/kg) (SE/E 1988).

A composite sample of three surface soil samples from an area of the black sand fill material was collected in November 1987, and submitted for EP Toxicity analysis [see Supplemental Figure 3 from SE/E (1988)]. None of the results reportedly exceeded maximum allowable levels (SE/E 1988).

Test pits [#6, 7, 8, 9, 10, and 11 in Supplemental Figure 3 from SE/E (1988)] were dug in the black sand fill in 1987 to determine the thickness of the fill deposit and whether residual oil saturation in the sand was present. Two soil samples were collected, one of which appeared oily (SE/E 1988). The samples were analyzed for various analytes including weight-percent oil and grease, total halogenated organics (TOX), VOCs, PCBs, and EP Toxicity metals. Oil and grease (400 mg/kg), TOX (294 mg/kg), xylene (0.31 mg/kg), and barium (0.31 mg/L) were detected (SE/E 1988).

Four upland surface (0.5 foot bgs) soil samples were collected for the PA in April 2001 (Bridgewater 2002b). The locations included the CFMW operations yard and along the railroad drainage area, as shown in Supplemental Figure 2-1 from Bridgewater (2002b). The samples were submitted for petroleum hydrocarbons, SVOCs, and total and TCLP metals. Results for detected analytes are summarized below.

DO NOT QUOTE OR CITE

This document is currently under review by US EPA and its federal, state, and tribal partners, and is subject to change in whole or in part

| Analyte | Minimum Concentration (mg/kg) | Maximum Concentration (mg/kg) |
|--|-------------------------------------|-------------------------------------|
| Total Petroleum Hydrocarbons (TPH) | | |
| TPH-Dx (Heavy Oil Range) | 3130 U | 13,500 |
| Polycyclic Aromatic Hydrocarbons (PAHs) | | |
| Benzo(a)anthracene | 0.067 U | 0.259 |
| Benzo(a)pyrene | 0.067 U | 0.401 |
| Benzo(b)fluoranthene | 0.123 | 0.566 |
| Benzo(g,h,i)perylene | 0.0953 | 0.486 |
| Benzo(k)fluoranthene | 0.068 | 0.34 |
| Chrysene | 0.11 | 0.438 |
| Fluoranthene | 0.086 | 0.384 |
| Inden(1,2,3-c,d)pyrene | 0.067 U | 0.379 |
| Phenanthrene | 0.067 U | 0.224 |
| Pyrene | 0.092 | 0.314 |
| LPAH | 0.067 U | 0.224 |
| HPAH | 0.574 | 3.791 |
| Metals | | |
| Antimony | 0.918 | 3.32 |
| Arsenic | 9.69 | 18.4 |
| Cadmium | 0.814 | 3.05 |
| Chromium | 48.7 | 812 |
| Copper | 136 | 612 |
| Lead | 106 | 184 |
| Mercury | 0.1 U | 0.136 |
| Nickel | 62 | 1240 |
| Zinc | 246 | 526 |
| TCLP Metals (mg/L) | | |
| TCLP Cadmium | 0.5 U | 0.5 U |
| TCLP Copper | 0.5 U | 0.943 |
| TCLP Nickel | 0.5 U | 1.07 |
| TCLP Zinc | 1.27 | 3.22 |

10.1.2. Riverbank Samples☒ Yes ☐ No

Surface and subsurface soil samples were collected along the riverbank of the CSC site in association with the PA in April 2001 (Bridgewater 2002b). The locations included three subsurface direct-push borings, surface soil samples from beneath pipe outfalls along the bank, samples of the black sand fill material on the beach and bank, and a soil sample from beneath metal debris on the beach, as shown in Supplemental Figure 2-1 from Bridgewater (2002b). The samples were submitted for analyses of petroleum hydrocarbons, SVOCs, and total and TCLP metals. In addition, the subsurface soil samples were submitted for VOC analysis (none were detected), and select samples of the black sand were analyzed for PCBs. Additional surface samples of the black sand were collected in June and July, 2001, and were analyzed for total and TCLP lead. Results for detected analytes are summarized below. Separate tables are provided for each sampling area.

DO NOT QUOTE OR CITE

This document is currently under review by US EPA and its federal, state, and tribal partners, and is subject to change in whole or in part

Page 12 of 21

CRAW00004833

| Analyte | Minimum Concentration (mg/kg) | Maximum Concentration (mg/kg) |
|---|-------------------------------------|-------------------------------------|
| Waterfront Push Probes | | |
| Total Petroleum Hydrocarbons (TPH) | | |
| TPH-G | 4 U | 4.84 |
| Metals | | |
| Arsenic | 8.08 | 8.08 |
| Chromium | 20.7 | 20.7 |
| Copper | 24.4 | 24.4 |
| Lead | 14.7 | 14.7 |
| Nickel | 20.3 | 20.3 |
| Zinc | 87.5 | 87.5 |

| Analyte | Minimum Concentration (mg/kg) | Maximum Concentration (mg/kg) |
|--|-------------------------------------|-------------------------------------|
| Pipe Outfall | | |
| Total Petroleum Hydrocarbons (TPH) | | |
| TPH-G | 4 U | 4.8 |
| TPH-D | 25 U | 31.7 |
| TPH-Dx (Heavy Oil Range) | 50 U | 70.4 |
| Polycyclic Aromatic Hydrocarbons (PAHs) | | |
| Pyrene | 0.33 U | 0.334 |
| LPAH | 0.33 U | 0.334 |
| Metals | | |
| Arsenic | 2.91 | 12.7 |
| Chromium | 24.4 | 32.3 |
| Copper | 24.8 | 30.2 |
| Lead | 18.1 | 40.6 |
| Mercury | 0.1 U | 0.405 |
| Nickel | 22 | 27.7 |
| Zinc | 22.7 U | 122 |
| TCLP Metals (mg/L) | | |
| TCLP Zinc | 0.765 | 0.765 |

DO NOT QUOTE OR CITE

This document is currently under review by US EPA and its federal, state, and tribal partners, and is subject to change in whole or in part

| Analyte | Minimum Concentration (mg/kg) | Maximum Concentration (mg/kg) |
|---|-------------------------------------|-------------------------------------|
| Black Sand - Beach | | |
| <i>Total Petroleum Hydrocarbons (TPH)</i> | | |
| TPH-D | 25 U | 78.3 |
| TPH-Dx (Heavy Oil Range) | 50 U | 194 |
| <i>Polycyclic Aromatic Hydrocarbons (PAHs)</i> | | |
| Acenaphthene | 0.33 U | 0.096 |
| Anthracene | 0.067 U | 0.192 |
| Benzo(a)anthracene | 0.33 U | 0.498 |
| Benzo(a)pyrene | 0.33 U | 0.768 |
| Benzo(b)fluoranthene | 0.33 U | 0.728 |
| Benzo(g,h,i)perylene | 0.33 U | 0.573 |
| Benzo(k)fluoranthene | 0.33 U | 0.682 |
| Chrysene | 0.33 U | 0.632 |
| Dibenzo(a,h)anthracene | 0.067 U | 0.168 |
| Fluoranthene | 0.33 U | 0.927 |
| Fluorene | 0.067 U | 0.100 |
| Inden(1,2,3-c,d)pyrene | 0.067 U | 0.515 |
| Phenanthrene | 0.33 U | 0.658 |
| Pyrene | 0.33 U | 0.742 |
| LPAH | 0.168 | 1.046 |
| HPAH | 0.901 | 6.233 |
| <i>Metals</i> | | |
| Arsenic | 5.65 | 5.65 |
| Chromium | 69 | 202 |
| Copper | 170 | 170 |
| Lead | 26 | 2150 |
| Mercury | 0.1 U | 0.167 |
| Nickel | 29 | 29 |
| Zinc | 178 | 178 |
| <i>TCLP Metals (mg/L)</i> | | |
| TCLP Chromium | 0.5 U | 0.5 |
| TCLP Lead | 0.5 U | 16.8 |
| TCLP Zinc | 1.45 | 1.45 |

Soil samples were collected from the perimeter and bottom of the beach removal area following the black sand removal action completed in October 2001 (see Section 11.1 below). The samples were analyzed for TPH, PAHs, PCBs, total metals, and TCLP lead. Supplemental Figure 4-1 from Bridgewater 2002a shows the sample locations.

DO NOT QUOTE OR CITE

This document is currently under review by US EPA and its federal, state, and tribal partners, and is subject to change in whole or in part

| Analyte | Minimum Concentration (mg/kg) | Maximum Concentration (mg/kg) |
|--|-------------------------------------|-------------------------------------|
| Removal Area Soil | | |
| Total Petroleum Hydrocarbons (TPH) | | |
| <i>Bottom</i> | | |
| TPH-D | 54.3 U | 53.4 |
| TPH-Dx (Heavy Oil Range) | 109 U | 179 |
| <i>Perimeter</i> | | |
| TPH-Dx (Heavy Oil Range) | 101 U | 87 |
| Polycyclic Aromatic Hydrocarbons (PAHs) | | |
| <i>Bottom</i> | | |
| Acenaphthene | 0.05 U | 0.105 |
| Acenaphthylene | 0.05 U | 0.065 |
| Anthracene | 0.05 U | 0.575 |
| Benzo(a)anthracene | 0.07 | 0.435 |
| Benzo(a)pyrene | 0.095 | 0.585 |
| Benzo(b)fluoranthene | 0.06 | 0.385 |
| Benzo(g,h,i)perylene | 0.05 U | 0.47 |
| Benzo(k)fluoranthene | 0.09 | 0.645 |
| Chrysene | 0.11 | 0.595 |
| Dibenzo(a,h)anthracene | 0.05 U | 0.1 |
| Fluoranthene | 0.16 | 1.21 |
| Fluorene | 0.05 U | 0.17 |
| Indeno(1,2,3-c,d)pyrene | 0.05 U | 0.275 |
| Naphthalene | 0.05 U | 0.14 |
| Phenanthrene | 0.08 | 1.04 |
| Pyrene | 0.017 | 1.54 |
| LPAH | 0.23 | 2.12 |
| HPAH | 0.78 | 6.31 |
| <i>Perimeter</i> | | |
| Acenaphthene | 0.05 U | 0.075 |
| Acenaphthylene | 0.05 U | 0.085 |
| Anthracene | 0.05 U | 0.5 |
| Benzo(a)anthracene | 0.05 U | 0.6 |
| Benzo(a)pyrene | 0.05 U | 0.885 |
| Benzo(b)fluoranthene | 0.05 U | 0.56 |
| Benzo(g,h,i)perylene | 0.05 U | 0.69 |
| Benzo(k)fluoranthene | 0.05 U | 0.285 |
| Chrysene | 0.05 U | 0.845 |
| Fluoranthene | 0.05 U | 1.49 |
| Fluorene | 0.05 U | 0.15 |
| Indeno(1,2,3-c,d)pyrene | 0.05 U | 0.47 |
| Naphthalene | 0.05 U | 0.095 |
| Phenanthrene | 0.05 U | 0.795 |
| Pyrene | 0.05 U | 2.06 |
| LPAH | 0.05 U | 1.70 |
| HPAH | 0.05 U | 8.41 |

DO NOT QUOTE OR CITE

This document is currently under review by US EPA and its federal, state, and tribal partners, and is subject to change in whole or in part

| Metals | | |
|---------------------------|-------|------|
| Bottom | | |
| Chromium | 33.2 | 144 |
| Copper | 292 | 1390 |
| Lead | 30.6 | 1890 |
| Mercury | 0.1 U | 0.21 |
| Nickel | 24.5 | 129 |
| Zinc | 132 | 384 |
| Perimeter | | |
| Chromium | 61.1 | 179 |
| Copper | 581 | 1890 |
| Lead | 11.6 | 3130 |
| Nickel | 26.9 | 285 |
| Zinc | 94.7 | 314 |
| TCLP Metals (mg/L) | | |
| Bottom | | |
| TCLP Lead | 0.06 | 23 |
| Perimeter | | |
| TCLP Lead | 1.27 | 3.9 |

In the post-removal soil samples, PCBs were not detected at or above the 0.05 mg/kg reporting limit; however, the detection limit is above the 0.034 mg/kg DEQ Screening Level Value (SLV) (Bridgewater 2002a). In addition, the DEQ sediment screening level values for these metals were exceeded in one or more samples. TCLP lead concentrations ranged up to 23 mg/L in the four samples analyzed (Bridgewater 2002a).

Additional samples were collected from three beach transects in December 2001 (Bridgewater 2002c). Sample stations were located at the toe of the bank, a mid-point, and from a shallow water location at each transect, and at a point on the western edge of the beach. Samples were collected at each location: 1) from 0 to 2 inches bgs, and 2) from approximately 2 to 3 feet bgs. The samples were analyzed for copper, lead, and nickel by EPA Method 6000/7000 series. These metals were apparently selected based on the results of the removal action confirmation samples, which contained concentrations of these metals above DEQ SLVs (DEQ 2002, pers. comm.). Copper concentrations ranged from 31.8 to 700 mg/kg in the surface samples, and from 27.7 to 902 mg/kg in the subsurface samples. Lead concentrations ranged from 10.2 to 54.5 mg/kg in the surface samples, and from 11.5 to 61.1 mg/kg in the subsurface samples. Nickel concentrations ranged from 14 to 57.5 mg/kg in the surface samples, and from 18.9 to 102 mg/kg in the subsurface samples (Bridgewater 2002c).

One sample of beach sediment was collected during the 2002 Round 1 sampling event as part of the Portland Harbor RI/FS (sample 06B030, Figure 1). This sample was analyzed for metals, SVOCs, PCBs (as Aroclors), chlorinated pesticides, herbicides, grain-size distribution, and other conventional parameters. Pesticides, herbicides, and phenols were not detected. Various metals, except mercury and selenium, were detected. Aroclor 1260 was the only PCB detected, at 16 µg/kg. Various PAHs were detected; LPAHs totaled 57 µg/kg, and HPAHs totaled 555 µg/kg. Two phthalates, bis(2-ethylhexyl)phthalate and diethyl phthalate, were detected at 210 µg/kg and 48 µg/kg, respectively. In addition to the above SVOC groups, carbazole was detected at 5.4 µg/kg (see Integral 2004).

DO NOT QUOTE OR CITE

This document is currently under review by US EPA and its federal, state, and tribal partners, and is subject to change in whole or in part

10.1.3. Summary

Analytical results from soil sampling at the site suggest:

- Relatively low soil contaminant levels were identified from a limited number of samples collected at the former USTs locations (ES/E 1988).
- The results of the PA samples indicate contaminants, including PAHs, metals (including leachable chromium, lead, and zinc), and particularly petroleum hydrocarbons, are present in surface soil in the drainage pathways at the site that may be transported by overland flow during storm events.
- Metals and low levels of gasoline were the only constituents detected in the limited number of subsurface soil samples collected at the site.
- Lead, mercury, and pyrene concentrations in the soil sample near an abandoned 8-inch steel outfall exceeded DEQ threshold sediment screening criteria (DEQ 2001, pers. comm.).
- Elevated arsenic, chromium, copper, nickel, and zinc concentrations were found in the sample near the beach metal debris (DEQ 2001, pers. comm.).
- The samples collected after the 2001 black sand removal action indicate levels of many organic contaminants were lowered but not completely remediated.
- Elevated metals concentrations remain on the shoreline (DEQ 2002, pers. comm.; Bridgewater 2002c).

10.2. Groundwater

10.2.1. Groundwater Investigations

☒ Yes ☐ No

Groundwater samples collected from two investigative borings were analyzed for TOX during the 1988 site investigation (Bridgewater 2000). Although the samples had detections of TOX, this older analytical method is susceptible to interference from organic material (e.g., wood waste). Therefore, the older data were considered less reliable than groundwater data collected from monitoring wells completed during the sampling phase of the PA (Bridgewater 2002b).

On April 25, 2001, groundwater samples were collected from three monitoring wells at the site located near the Willamette River [see Supplemental Figure 2-1 from Bridgewater (2002b)]. Low levels of metals were detected in the samples. With the exception of monitoring well PP-3, no petroleum hydrocarbons, VOCs, or SVOCs were detected in the samples. Low concentrations of PAHs were detected in the sample collected from PP-3. On June 20, 2001, PP-3 was resampled because the original groundwater sample was apparently turbid. No PAHs were detected in the groundwater sample collected during the second monitoring event. Bridgewater concluded that the original groundwater sample was not considered to be representative of groundwater conditions at the PP-3 location (Bridgewater 2002b).

10.2.2. NAPL (Historic & Current)

☐ Yes ☒ No

10.2.3. Dissolved Contaminant Plumes

☐ Yes ☒ No

No plumes have been identified at the site.

Plume Characterization Status ☒ Complete ☐ Incomplete

According to the DEQ (2004), sufficient groundwater data have been collected at the site to assess potential groundwater discharge impacts to the Willamette River.

DO NOT QUOTE OR CITE

This document is currently under review by US EPA and its federal, state, and tribal partners, and is subject to change in whole or in part

Plume Extent

No plumes have been identified at the site.

Min/Max Detections (Current situation)

Not applicable (N/A)

Current Plume Data

N/A.

Preferential Pathways

No preferential pathways were identified at the site.

Downgradient Plume Monitoring Points (min/max detections)

N/A.

Visual Seep Sample Data

☐ Yes ☒ No

No seeps have been identified at the site (GSI 2003).

Nearshore Porewater Data

No porewater data have been collected at the site.

Groundwater Plume Temporal Trend

N/A.

10.2.4. Summary

Groundwater samples were collected from three monitoring wells at the site located near the Willamette River (Bridgewater 2002b). Contaminants of interest were not detected in representative groundwater samples collected from the three monitoring wells. For this site, groundwater does not appear to be a migration pathway for contaminants to the Willamette River (DEQ 2004).

10.3. Surface Water

10.3.1. Surface Water Investigation

☐ Yes ☒ No

No surface water investigations have been completed at the site.

10.3.2. General or Individual Stormwater Permit (Current or Past)

☒ Yes ☐ No

CFMW was issued a General NPDES permit No. 1200-L on October 7, 1992, but it was terminated 13 days later after it was determined that the facility did not discharge directly to a waterway and that a permit was not required (CFMW 1999, pers. comm.; DEQ 1999).

Do other non-stormwater wastes discharge to the system?

☒ Yes ☐ No

Historically, wash water from the former paint room discharged to the storm drains in the CFMW operations yard (SE/E 1988).

10.3.3. Stormwater Data

☐ Yes ☐ No

A stormwater sample was collected at the CFMW facility by the Portland BES in June 1997, and analyzed for metals. The sample was collected from the western drain pipe outlet of the yard area. Copper (0.01 mg/L), selenium (0.047 mg/L), and zinc (0.065 mg/L) were detected (DEQ 1999).

DO NOT QUOTE OR CITE

This document is currently under review by US EPA and its federal, state, and tribal partners, and is subject to change in whole or in part

- 10.3.4. **Catch Basin Solids Data** ☐ Yes ☒ No
10.3.5. **Wastewater Permit** ☐ Yes ☒ No
10.3.6. **Wastewater Data** ☐ Yes ☒ No
10.3.7. **Summary**

Surface water data for the CSC site are limited; relatively low concentrations of copper, selenium, and zinc were detected in a stormwater sample collected at an unknown location.

10.4. Sediment

- 10.4.1. **River Sediment Data** ☒ Yes ☐ No

As shown in Figure 1, three sediment samples have been collected from the river adjacent to the CSC site: SD060, collected in 1998 as part of the Portland Harbor Sediment Investigation (Weston 1998); 06R040, located just upstream of the CSC property line and 06B030, a beach sediment sample collected during Round 1 sampling for the Portland Harbor RI/FS (Integral 2004). Analytes for these three samples included metals, butyltins, VOCs, SVOCs, PCB (as Aroclors), chlorinated pesticides, herbicides, grain-size distribution, and other conventional parameters. The analytical results are presented in Table 2. Three additional surface and core sampling locations offshore from the CSC site were proposed during the Round 2 sediment investigation.

10.4.2. **Summary**

See Final CSM Update.

11. CLEANUP HISTORY AND SOURCE CONTROL MEASURES

11.1. Soil Cleanup/Source Control

A black sand removal action occurred on the southwest corner of the site near the Willamette in October 2001. Approximately 381 tons of black sand were removed from the beach and bank edge [see Supplemental Figure 3-1 from Bridgewater (2002a)]. After testing indicated the removed material was not hazardous, it was disposed of at the Hillsboro solid waste landfill. Following removal of the excavation stockpile, the surface of the stockpile storage area was scraped and the surface soil was also disposed of in an offsite landfill. The excavated area along the top of the bank was backfilled and seeded; no backfill was placed in the beach removal area per the approved work plan (Bridgewater 2002a).

11.2. Groundwater Cleanup/Source Control

No groundwater cleanup or source controls have been conducted at the site.

11.3. Other

No other source control actions are described in reports reviewed for this site.

11.4. Potential for Recontamination from Upland Sources

See Final CSM Update.

DO NOT QUOTE OR CITE

This document is currently under review by US EPA and its federal, state, and tribal partners, and is subject to change in whole or in part

12. BIBLIOGRAPHY / INFORMATION SOURCES

References cited:

Bridgewater. 2000. Preliminary Assessment, Crawford Street Site, Portland, Oregon. Prepared for Crawford Street Corporation. Bridgewater Group, Inc., Portland, OR.

Bridgewater. 2001. Personal communication (memo of 4/4/01 from Ross Rieke, Bridgewater, to Tom Gainer, DEQ, presenting proposed additional sampling locations for the Crawford Street Corporation Preliminary Assessment). Bridgewater Group, Inc., Portland, OR.

Bridgewater. 2002a. Black Sand Removal Action, Crawford Street Site, Portland, Oregon. Prepared for Crawford Street Corporation. Bridgewater Group, Inc., Portland, OR.

Bridgewater. 2002b. Preliminary Assessment Soil and Groundwater Sampling Report, Crawford Street Site, Portland, Oregon. Prepared for Crawford Street Corporation. Bridgewater Group, Inc., Portland, OR.

Bridgewater. 2002c. Results of Beach Soil Sampling and Analysis, Crawford Street Corporation site Memo to Tom Gainer, DEQ, from Ross Rieke, Bridgewater Group. Bridgewater Group, Inc., Portland, OR.

CFMW. 1999. Personal communication (letter of 4/9/99 from Doug McMullin, General Manager CFMW to Steve Fortuna, DEQ, regarding Response to Information Request). Columbia Forge & Machine Works, Inc. Portland, OR.

DEQ. 1999. DEQ Site Assessment Program Strategy Recommendation, Crawford Street Corporation. Oregon Department of Environmental Quality, Portland, OR.

DEQ. 2001. Personal communication (letter of 6/26/01 to M. Cusma, Schnitzer Steel Industries, regarding Crawford Street Corporation site, 8424 and 8524 N. Crawford Street, Portland, Oregon, XPA Sampling Results). Oregon Department of Environmental Quality, Portland, OR.

DEQ. 2002. Personal communication (letter of 2/7/02 to M. Cusma, Schnitzer Steel Industries, regarding Crawford Street Corporation site, 8424 and 8524 N. Crawford Street, Portland, Oregon, Black Sand Removal). Oregon Department of Environmental Quality, Portland, OR.

DEQ. 2004. DEQ Site Summary Report – Details for Site ID 2363. DEQ Environmental Cleanup Site (ECSI) Database. Accessed May 31, 2004. www.deq.state.or.us/wmc/ecsi/ecsidetail.asp?seqnbr=2363.

EPA. 2001. Envirofacts Warehouse, Facility Information, Columbia Forge and Machine Works, 8424 N. Crawford Street, Portland, Oregon. http://oaspub.epa.gov/enviro/fii_query_dtl_disp_program_facility?

FSM. 2002. Lower Willamette Group, Non-Voting Member Status Criteria, Crawford Street Corporation. February 13, 2002. Floyd Snider McCarthy, Portland, OR.

Geiselbrecht, A. 2002. Notes regarding phone conversation with Eric Blischke (DEQ), regarding Crawford Street Properties. February 11, 2002, 1500-1515.

GSI. 2003. Technical Memorandum: Results of Seep Reconnaissance Survey, River Mile 22-10.5, Lower Willamette River. Groundwater Solutions, Inc., Portland, OR.

Integral. 2004. Round 1 Site Characterization Report. Prepared for Lower Willamette Group, Portland, OR. Integral Consulting, Inc., Mercer Island, WA.

Integral and DEA. 2004. Lower Willamette River February 2004 Multibeam Bathymetric Survey Report. Draft. Prepared for Lower Willamette Group, Portland, OR. Integral Consulting, Inc. Mercer Island, WA, and David Evans and Associates, Inc., Portland, OR.

DO NOT QUOTE OR CITE

This document is currently under review by US EPA and its federal, state, and tribal partners, and is subject to change in whole or in part

Integral, Windward, Kennedy/Jenks, Anchor Environmental, and Groundwater Solutions. 2004. Portland Harbor RI/FS Programmatic Work Plan. Prepared for the Lower Willamette Group, Portland, OR. Integral Consulting, Inc., Mercer Island, WA.

SE/E. 1988. Environmental Evaluation, Proposed Manufacturing Management, Inc. Site (Lampros Steel), St. Johns District, Portland, Oregon. Submitted to Attorneys for Manufacturing Management, Inc., Portland, OR. Sweet-Edwards/Emcon, Inc. Kelso, WA.

Weston. 1998. Portland Harbor Sediment Investigation Report, Multnomah County, Oregon. Report No. 04000-019-036-AACE. Prepared for U.S. Environmental Protection Agency and Oregon Department of Environmental Quality, Portland, OR. Roy F. Weston, Inc., Seattle, WA.

Other relevant references/information sources:

Bridgewater. 2000. Personal communication (letter of 4/17/00 from Ross Rieke, Bridgewater to Tom Gainer, DEQ, regarding Crawford Street Corporation Preliminary Assessment). Bridgewater Group, Inc., Portland, OR.

EDR. 2002. EDR Environmental Atlas, Portland Harbor, Multnomah. OR. Environmental Data Resources, Southport, CT.

Figures:

Figure 1. Site Features

Tables:

Table 1. Potential Sources and Transport Pathways Assessment

Table 2. Queried Sediment Chemistry Data

Supplemental Figures:

Figure 2-1. Site Plan (Bridgewater 2000)

Figure 1. Shoreline Features (Bridgewater 2001)

Figure 2-4. Columbia Forge Site Plan (Bridgewater 2000)

Figure 2-1. PA Sampling Locations (Bridgewater 2002b)

Figure 3-1. Historical Site Features (Bridgewater 2000)

Figure 3. Historical Site Features (SE/E 1988)

Figure 3-1. Black Sand Removal Areas (Bridgewater 2002a)

Figure 4-1. Post-Removal Soil Sample Locations (Bridgewater 2002a)

Figure 4-2. Post-Removal Soil Analytical Results (Bridgewater 2002a)

Supplemental Tables:

Table 3 and Figure 2. Historical Property Ownership (SE/E 1988)

Tables 2-1 through 2-4. Chemical Concentrations in Soil Samples (Bridgewater 2002b)

Tables 4-1 through 4-5. Concentrations in Removal Area Soil Samples (Bridgewater 2002a)

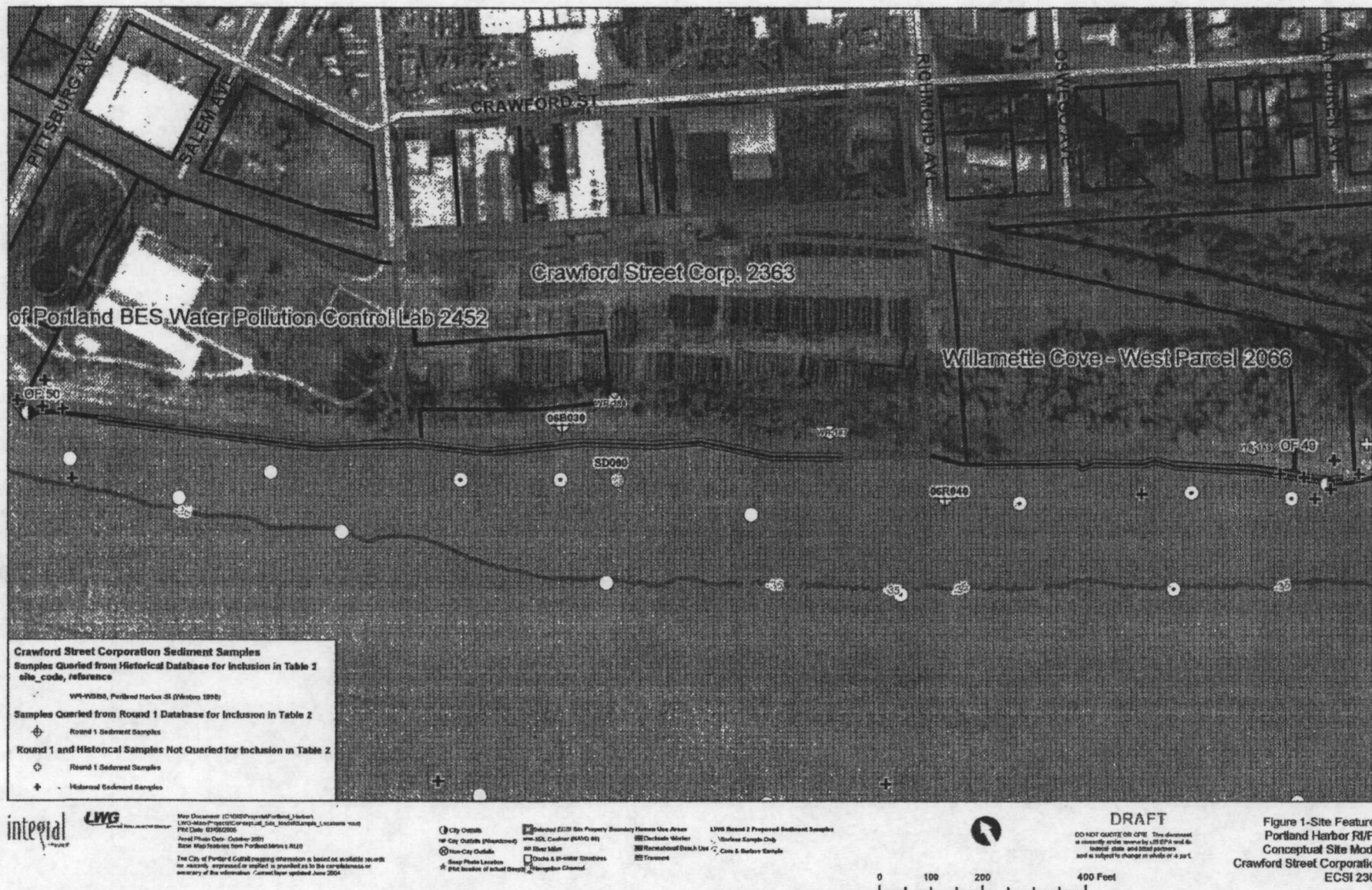
DO NOT QUOTE OR CITE

This document is currently under review by US EPA and its federal, state, and tribal partners, and is subject to change in whole or in part

FIGURES

Figure 1. Site Features

DO NOT QUOTE OR CITE
This document is currently under review by US EPA and its federal, state, and
tribal partners, and is subject to change in whole or in part



TABLES

Table 1: Potential Sources and Transport Pathways Assessment
Table 2: Queried Sediment Chemistry Data

DO NOT QUOTE OR CITE

This document is currently under review by US EPA and its federal, state, and tribal partners, and is subject to change in whole or in part

Crawford Street Corporation #2363
Table 1 Potential Sources and Transport Pathways Assessment

Last Updated March 4, 2005

| Potential Sources | Media Impacted | | | | | COIs | | | | | | | | | | | | | | | Potential Complete Pathway | | | | | |
|---|----------------|-----------------|-------------|--------------------|----------------|----------------|----------------|-----------------|-------------------------------|------|------------------|-------|------|------------|-----------|--------|------|---------------------------|----------------|-----------|----------------------------|-------------|------------------------------|-------------------------------------|-------------------|--|
| Description of Potential Source | Surface Soil | Subsurface Soil | Groundwater | Catch Basin Solids | River Sediment | TPH | | | VOCs | | | SVOCs | PAHs | Phthalates | Phenolics | Metals | PCBs | Herbicides and Pesticides | Dioxins/Furans | Butyltins | Overland Transport | Groundwater | Direct Discharge - Overwater | Direct Discharge - Storm/Wastewater | Riverbank Erosion | |
| | | | | | | Gasoline-Range | Diesel - Range | Heavier - Range | Petroleum-Related (e.g. BTEX) | VOCs | Chlorinated VOCs | | | | | | | | | | | | | | | |
| Upland Areas | | | | | | | | | | | | | | | | | | | | | | | | | | |
| A | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Current site manufacturing and maintenance operations | ✓ | ? | ? | ? | ? | | ✓ | ✓ | | ✓ | ✓ | | ✓ | | | ✓ | | | | | ✓ | ? | ? | ✓ | ✓ | |
| Current and former site runoff | ✓ | ? | ? | ? | ? | | ✓ | ✓ | | ✓ | ✓ | | ✓ | | | ✓ | | | | | ✓ | ? | ? | ✓ | ✓ | |
| Imported sandblast fill material | ✓ | ? | ? | ? | ? | | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | | | ✓ | | | | | ✓ | ? | ? | ✓ | ✓ | |
| Former USTs | | ? | ? | ? | ? | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | | | ✓ | | | | | ✓ | ? | ? | ✓ | ✓ | |
| Railroad right-of-way | ✓ | ? | ? | ? | ? | | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | | | ✓ | | | | | ✓ | ? | ? | ✓ | ✓ | |
| Electrical transformer | ? | ? | ? | ? | ? | | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | | | ✓ | | | | | ✓ | ? | ? | ✓ | ✓ | |
| Historical facility operations | ? | ? | ? | ? | ? | | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | | | ✓ | | | | ✓ | ✓ | ? | ? | ✓ | ✓ | |
| Overwater Areas | | | | | | | | | | | | | | | | | | | | | | | | | | |
| B | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Imported sandblast fill material | | | | | | | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | | | ✓ | | | | | ✓ | | ✓ | ✓ | ✓ | |
| Historical dock operations (unknown) | | | | | | | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | | | ✓ | | | | | ✓ | | ✓ | ✓ | ✓ | |
| Outfalls | | | | | | | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | | | ✓ | | | | | ✓ | | ✓ | ✓ | ✓ | |
| Beach metal debris | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Other Areas/Other Issues | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | |

Notes:

All information provided in this table is referenced in the site summaries. If information is not available or inconclusive, a ? may be used, as appropriate. No new information is provided in this table.

✓ = Source, COI are present or current or historic pathway is determined to be complete or potentially complete

? = There is not enough information to determine if source or COI is present or if pathway is complete

Blank = Source, COI and historic and current pathways have been investigated and shown to be not present or incomplete

UST = Underground storage tank
AST = Above-ground storage tank
TPH = Total petroleum hydrocarbons
VOCs = Volatile organic compounds
SVOCs = Semivolatile organic compounds
PAHs = Polycyclic aromatic hydrocarbons
BTEX = Benzene, toluene, ethylbenzene and xylene
PCBs = Polychlorinated biphenyls

DO NOT QUOTE OR CITE
This document is currently under review by USFPA

Table 2. Queried Sediment Chemistry Data

| Surface or Subsurface | Analyte | Number of Samples | Number Detected | % Detected | Detected Concentrations | | | | | Detected and Nondetected Concentrations | | | | |
|--------------------------|----------------------------------|----------------------|--------------------|---------------|-------------------------|---------|-------|--------|-------|---|---------|-------|--------|--------|
| | | | | | Minimum | Maximum | Mean | Median | 95th | Minimum | Maximum | Mean | Median | 95th |
| surface | Aroclor 1016 (ug/kg) | 2 | 0 | 0 | | | | | | 3.8 U | 3.9 U | 3.85 | 3.8 U | 3.8 U |
| surface | Aroclor 1242 (ug/kg) | 2 | 0 | 0 | | | | | | 3.8 U | 3.9 U | 3.85 | 3.8 U | 3.8 U |
| surface | Aroclor 1248 (ug/kg) | 2 | 0 | 0 | | | | | | 3.8 U | 8.1 U | 5.95 | 3.8 U | 3.8 U |
| surface | Aroclor 1254 (ug/kg) | 2 | 0 | 0 | | | | | | 8.1 U | 31 U | 19.6 | 8.1 U | 8.1 U |
| surface | Aroclor 1260 (ug/kg) | 2 | 2 | 100 | 16 | 42 | 29 | 16 | 16 | 16 | 42 | 29 | 16 | 16 |
| surface | Aroclor 1221 (ug/kg) | 2 | 0 | 0 | | | | | | 7.6 U | 7.8 U | 7.7 | 7.6 U | 7.6 U |
| surface | Aroclor 1232 (ug/kg) | 2 | 0 | 0 | | | | | | 3.8 U | 3.9 U | 3.85 | 3.8 U | 3.8 U |
| surface | Polychlorinated biphenyl (ug/kg) | 2 | 2 | 100 | 16 | 42 | 29 | 16 | 16 | 16 | 42 | 29 | 16 | 16 |
| surface | Butyltin ion (ug/kg) | 1 | 1 | 100 | 52 J | 52 J | 52 | 52 J | 52 J | 52 J | 52 J | 52 | 52 J | 52 J |
| surface | Dibutyltin ion (ug/kg) | 1 | 1 | 100 | 59 | 59 | 59 | 59 | 59 | 59 | 59 | 59 | 59 | 59 |
| surface | Tributyltin ion (ug/kg) | 1 | 1 | 100 | 350 J | 350 J | 350 | 350 J | 350 J | 350 J | 350 J | 350 | 350 J | 350 J |
| surface | Tetrabutyltin (ug/kg) | 1 | 0 | 0 | | | | | | 5.9 U | 5.9 U | 5.9 | 5.9 U | 5.9 U |
| surface | Total solids (percent) | 2 | 2 | 100 | 65.6 | 91.2 | 78.4 | 65.6 | 65.6 | 65.6 | 91.2 | 78.4 | 65.6 | 65.6 |
| surface | Total organic carbon (percent) | 3 | 3 | 100 | 0.93 | 1.8 | 1.38 | 1.4 | 1.4 | 0.93 | 1.8 | 1.38 | 1.4 | 1.4 |
| surface | Gravel (percent) | 3 | 3 | 100 | 1.05 | 10.7 | 5.45 | 4.59 | 4.59 | 1.05 | 10.7 | 5.45 | 4.59 | 4.59 |
| surface | Sand (percent) | 1 | 1 | 100 | 40.95 | 40.95 | 41 | 40.95 | 40.95 | 40.95 | 40.95 | 41 | 40.95 | 40.95 |
| surface | Very coarse sand (percent) | 2 | 2 | 100 | 4.31 | 5.34 | 4.83 | 4.31 | 4.31 | 4.31 | 5.34 | 4.83 | 4.31 | 4.31 |
| surface | Coarse sand (percent) | 2 | 2 | 100 | 12 | 17.2 | 14.6 | 12 | 12 | 12 | 17.2 | 14.6 | 12 | 12 |
| surface | Medium sand (percent) | 2 | 2 | 100 | 37.3 | 54.5 | 45.9 | 37.3 | 37.3 | 37.3 | 54.5 | 45.9 | 37.3 | 37.3 |
| surface | Fine sand (percent) | 2 | 2 | 100 | 4.6 | 23 | 13.8 | 4.6 | 4.6 | 4.6 | 23 | 13.8 | 4.6 | 4.6 |
| surface | Very fine sand (percent) | 2 | 2 | 100 | 3.19 | 8.72 | 5.96 | 3.19 | 3.19 | 3.19 | 8.72 | 5.96 | 3.19 | 3.19 |
| surface | Fines (percent) | 1 | 1 | 100 | 58 | 58 | 58 | 58 | 58 | 58 | 58 | 58 | 58 | 58 |
| surface | Silt (percent) | 1 | 1 | 100 | 51.31 | 51.31 | 51.3 | 51.31 | 51.31 | 51.31 | 51.31 | 51.3 | 51.31 | 51.31 |
| surface | Coarse silt (percent) | 2 | 2 | 100 | 1.44 | 4.62 | 3.03 | 1.44 | 1.44 | 1.44 | 4.62 | 3.03 | 1.44 | 1.44 |
| surface | Medium silt (percent) | 2 | 2 | 100 | 1.02 | 1.23 | 1.13 | 1.02 | 1.02 | 1.02 | 1.23 | 1.13 | 1.02 | 1.02 |
| surface | Fine silt (percent) | 2 | 2 | 100 | 0.69 | 1.52 | 1.11 | 0.69 | 0.69 | 0.69 | 1.52 | 1.11 | 0.69 | 0.69 |
| surface | Very fine silt (percent) | 2 | 2 | 100 | 0.42 | 0.95 | 0.685 | 0.42 | 0.42 | 0.42 | 0.95 | 0.685 | 0.42 | 0.42 |
| surface | Clay (percent) | 1 | 1 | 100 | 6.69 | 6.69 | 6.69 | 6.69 | 6.69 | 6.69 | 6.69 | 6.69 | 6.69 | 6.69 |
| surface | 8-9 Phi clay (percent) | 2 | 2 | 100 | 0.32 | 0.57 | 0.445 | 0.32 | 0.32 | 0.32 | 0.57 | 0.445 | 0.32 | 0.32 |
| surface | 9-10 Phi clay (percent) | 2 | 2 | 100 | 0.25 | 0.81 | 0.53 | 0.25 | 0.25 | 0.25 | 0.81 | 0.53 | 0.25 | 0.25 |
| surface | >10 Phi clay (percent) | 2 | 2 | 100 | 0.29 | 0.43 | 0.36 | 0.29 | 0.29 | 0.29 | 0.43 | 0.36 | 0.29 | 0.29 |
| surface | Dalapon (ug/kg) | 2 | 0 | 0 | | | | | | 16 U | 16 U | 16 | 16 U | 16 U |
| surface | Dicamba (ug/kg) | 2 | 0 | 0 | | | | | | 3.1 UJ | 3.2 U | 3.15 | 3.1 UJ | 3.1 UJ |
| surface | MCPA (ug/kg) | 2 | 0 | 0 | | | | | | 3100 U | 3200 U | 3150 | 3100 U | 3100 U |
| surface | Dichloroprop (ug/kg) | 2 | 0 | 0 | | | | | | 6.3 UJ | 6.3 UJ | 6.3 | 6.3 UJ | 6.3 UJ |
| surface | 2,4-D (ug/kg) | 2 | 0 | 0 | | | | | | 6.3 UJ | 6.3 U | 6.3 | 6.3 UJ | 6.3 UJ |
| surface | Silvex (ug/kg) | 2 | 0 | 0 | | | | | | 1.6 UJ | 1.6 U | 1.6 | 1.6 UJ | 1.6 UJ |
| surface | 2,4,5-T (ug/kg) | 2 | 0 | 0 | | | | | | 1.6 U | 1.6 U | 1.6 | 1.6 U | 1.6 U |
| surface | 2,4-DB (ug/kg) | 2 | 0 | 0 | | | | | | 3.1 U | 3.2 U | 3.15 | 3.1 U | 3.1 U |
| surface | Dinoseb (ug/kg) | 2 | 0 | 0 | | | | | | 3.1 U | 3.2 U | 3.15 | 3.1 U | 3.1 U |
| surface | MCPD (ug/kg) | 2 | 0 | 0 | | | | | | 3100 U | 3200 U | 3150 | 3100 U | 3100 U |

DO NOT QUOTE OR CITE
This document is currently under review by US EPA

Table 2 Queried Sediment Chemistry Data

| Surface or Subsurface | Analyte | Number of Samples | Number Detected | % Detected | Detected Concentrations | | | | | Detected and Nondetected Concentrations | | | | |
|-----------------------|----------------------------------|-------------------|-----------------|------------|-------------------------|---------|-------|--------|--------|---|---------|-------|--------|--------|
| | | | | | Minimum | Maximum | Mean | Median | 95th | Minimum | Maximum | Mean | Median | 95th |
| surface | Aluminum (mg/kg) | 3 | 3 | 100 | 17500 | 24700 | 20000 | 17900 | 17900 | 17500 | 24700 | 20000 | 17900 | 17900 |
| surface | Arsenic (mg/kg) | 3 | 3 | 100 | 4.4 | 9.9 | 6.43 | 5 | 5 | 4.4 | 9.9 | 6.43 | 5 | 5 |
| surface | Cadmium (mg/kg) | 3 | 3 | 100 | 0.1 | 0.4 | 0.21 | 0.13 | 0.13 | 0.1 | 0.4 | 0.21 | 0.13 | 0.13 |
| surface | Chromium (mg/kg) | 3 | 3 | 100 | 27.7 | 77 | 48.2 | 40 | 40 | 27.7 | 77 | 48.2 | 40 | 40 |
| surface | Copper (mg/kg) | 3 | 3 | 100 | 45.6 | 606 | 234 | 49.6 | 49.6 | 45.6 | 606 | 234 | 49.6 | 49.6 |
| surface | Lead (mg/kg) | 3 | 3 | 100 | 26 J | 36 | 30 | 28 | 28 | 26 J | 36 | 30 | 28 | 28 |
| surface | Manganese (mg/kg) | 1 | 1 | 100 | 397 | 397 | 397 | 397 | 397 | 397 | 397 | 397 | 397 | 397 |
| surface | Mercury (mg/kg) | 3 | 2 | 66.7 | 0.14 | 0.52 | 0.33 | 0.14 | 0.14 | 0.05 U | 0.52 | 0.237 | 0.14 | 0.14 |
| surface | Nickel (mg/kg) | 3 | 3 | 100 | 21.3 | 41 | 30.1 | 28 | 28 | 21.3 | 41 | 30.1 | 28 | 28 |
| surface | Selenium (mg/kg) | 3 | 1 | 33.3 | 12 | 12 | 12 | 12 | 12 | 0.2 U | 12 | 4.17 | 0.3 U | 0.3 U |
| surface | Silver (mg/kg) | 3 | 2 | 66.7 | 0.2 | 0.8 | 0.5 | 0.2 | 0.2 | 0.03 U | 0.8 | 0.343 | 0.2 | 0.2 |
| surface | Thallium (mg/kg) | 1 | 0 | 0 | | | | | | 4 U | 4 U | 4 | 4 U | 4 U |
| surface | Zinc (mg/kg) | 3 | 3 | 100 | 97.6 | 112 | 106 | 107 | 107 | 97.6 | 112 | 106 | 107 | 107 |
| surface | Barium (mg/kg) | 1 | 1 | 100 | 152 | 152 | 152 | 152 | 152 | 152 | 152 | 152 | 152 | 152 |
| surface | Beryllium (mg/kg) | 1 | 1 | 100 | 0.49 | 0.49 | 0.49 | 0.49 | 0.49 | 0.49 | 0.49 | 0.49 | 0.49 | 0.49 |
| surface | Calcium (mg/kg) | 1 | 1 | 100 | 6590 J | 6590 J | 6590 | 6590 J | 6590 J | 6590 J | 6590 J | 6590 | 6590 J | 6590 J |
| surface | Cobalt (mg/kg) | 1 | 1 | 100 | 11.3 | 11.3 | 11.3 | 11.3 | 11.3 | 11.3 | 11.3 | 11.3 | 11.3 | 11.3 |
| surface | Iron (mg/kg) | 1 | 1 | 100 | 32700 | 32700 | 32700 | 32700 | 32700 | 32700 | 32700 | 32700 | 32700 | 32700 |
| surface | Magnesium (mg/kg) | 1 | 1 | 100 | 5650 | 5650 | 5650 | 5650 | 5650 | 5650 | 5650 | 5650 | 5650 | 5650 |
| surface | Potassium (mg/kg) | 1 | 1 | 100 | 1340 | 1340 | 1340 | 1340 | 1340 | 1340 | 1340 | 1340 | 1340 | 1340 |
| surface | Sodium (mg/kg) | 1 | 1 | 100 | 816 | 816 | 816 | 816 | 816 | 816 | 816 | 816 | 816 | 816 |
| surface | Vanadium (mg/kg) | 1 | 1 | 100 | 84.9 | 84.9 | 84.9 | 84.9 | 84.9 | 84.9 | 84.9 | 84.9 | 84.9 | 84.9 |
| surface | 2-Methylnaphthalene (ug/kg) | 3 | 2 | 66.7 | 66 | 720 | 393 | 66 | 66 | 19 U | 720 | 268 | 66 | 66 |
| surface | Acenaphthene (ug/kg) | 3 | 2 | 66.7 | 60 | 570 | 315 | 60 | 60 | 19 U | 570 | 216 | 60 | 60 |
| surface | Acenaphthylene (ug/kg) | 3 | 2 | 66.7 | 57 | 2000 | 1030 | 57 | 57 | 19 U | 2000 | 692 | 57 | 57 |
| surface | Anthracene (ug/kg) | 3 | 2 | 66.7 | 90 | 2100 | 1100 | 90 | 90 | 19 U | 2100 | 736 | 90 | 90 |
| surface | Fluorene (ug/kg) | 3 | 2 | 66.7 | 56 | 1000 | 528 | 56 | 56 | 19 U | 1000 | 358 | 56 | 56 |
| surface | Naphthalene (ug/kg) | 3 | 2 | 66.7 | 160 | 3000 | 1580 | 160 | 160 | 19 U | 3000 | 1060 | 160 | 160 |
| surface | Phenanthrene (ug/kg) | 3 | 3 | 100 | 57 | 13000 | 4500 | 450 | 450 | 57 | 13000 | 4500 | 450 | 450 |
| surface | Low Molecular Weight PAH (ug/kg) | 3 | 3 | 100 | 57 | 21700 | 7540 | 873 A | 873 A | 57 | 21700 | 7540 | 873 A | 873 A |
| surface | Dibenz(a,h)anthracene (ug/kg) | 3 | 3 | 100 | 5 M | 2700 J | 934 | 98 | 98 | 5 M | 2700 J | 934 | 98 | 98 |
| surface | Benz(a)anthracene (ug/kg) | 3 | 3 | 100 | 40 | 4100 J | 1490 | 330 | 330 | 40 | 4100 J | 1490 | 330 | 330 |
| surface | Benzo(a)pyrene (ug/kg) | 3 | 3 | 100 | 51 | 7000 J | 2520 | 510 | 510 | 51 | 7000 J | 2520 | 510 | 510 |
| surface | Benzo(b)fluoranthene (ug/kg) | 3 | 3 | 100 | 61 | 2200 J | 890 | 410 | 410 | 61 | 2200 J | 890 | 410 | 410 |
| surface | Benzo(g,h,i)perylene (ug/kg) | 3 | 3 | 100 | 57 | 5900 J | 2120 | 400 | 400 | 57 | 5900 J | 2120 | 400 | 400 |
| surface | Benzo(k)fluoranthene (ug/kg) | 3 | 3 | 100 | 47 | 2400 J | 929 | 340 | 340 | 47 | 2400 J | 929 | 340 | 340 |
| surface | Chrysene (ug/kg) | 3 | 3 | 100 | 60 | 4200 J | 1570 | 440 | 440 | 60 | 4200 J | 1570 | 440 | 440 |
| surface | Fluoranthene (ug/kg) | 3 | 3 | 100 | 110 | 17000 | 5970 | 790 | 790 | 110 | 17000 | 5970 | 790 | 790 |
| surface | Indeno(1,2,3-cd)pyrene (ug/kg) | 3 | 3 | 100 | 40 | 15000 J | 5120 | 310 | 310 | 40 | 15000 J | 5120 | 310 | 310 |
| surface | Pyrene (ug/kg) | 3 | 3 | 100 | 84 | 16000 | 5630 | 820 | 820 | 84 | 16000 | 5630 | 820 | 820 |
| surface | Benzo(b+k)fluoranthene (ug/kg) | 1 | 1 | 100 | 750 A | 750 A | 750 | 750 A | 750 A | 750 A | 750 A | 750 | 750 A | 750 A |

DO NOT QUOTE OR CITE
This document is currently under review by US EPA

Table 2. Queried Sediment Chemistry Data

| Surface or Subsurface | Analyte | Number of Samples | Number Detected | % Detected | Detected Concentrations | | | | | Detected and Nondetected Concentrations | | | | |
|-----------------------|--|-------------------|-----------------|------------|-------------------------|---------|-------|--------|--------|---|---------|-------|--------|--------|
| | | | | | Minimum | Maximum | Mean | Median | 95th | Minimum | Maximum | Mean | Median | 95th |
| surface | High Molecular Weight PAH (ug/kg) | 3 | 3 | 100 | 555 M | 76500 J | 27200 | 4448 A | 4448 A | 555 M | 76500 J | 27200 | 4448 A | 4448 A |
| surface | Polycyclic Aromatic Hydrocarbons (ug/kg) | 1 | 1 | 100 | 5321 A | 5321 A | 5320 | 5321 A | 5321 A | 5321 A | 5321 A | 5320 | 5321 A | 5321 A |
| surface | 2,4'-DDD (ug/kg) | 1 | 0 | 0 | | | | | | 0.64 U | 0.64 U | 0.64 | 0.64 U | 0.64 U |
| surface | 2,4'-DDE (ug/kg) | 1 | 0 | 0 | | | | | | 4.6 U | 4.6 U | 4.6 | 4.6 U | 4.6 U |
| surface | 2,4'-DDT (ug/kg) | 1 | 0 | 0 | | | | | | 0.38 U | 0.38 U | 0.38 | 0.38 U | 0.38 U |
| surface | 4,4'-DDD (ug/kg) | 2 | 1 | 50 | 4.9 | 4.9 | 4.9 | 4.9 | 4.9 | 0.49 U | 4.9 | 2.7 | 0.49 U | 0.49 U |
| surface | 4,4'-DDE (ug/kg) | 1 | 0 | 0 | | | | | | 2.3 U | 2.3 U | 2.3 | 2.3 U | 2.3 U |
| surface | 4,4'-DDT (ug/kg) | 1 | 0 | 0 | | | | | | 1.8 U | 1.8 U | 1.8 | 1.8 U | 1.8 U |
| surface | Total of 3 isomers, pp-DDT, -DDD, -DDE (ug/kg) | 2 | 1 | 50 | 4.9 | 4.9 | 4.9 | 4.9 | 4.9 | 2.3 U | 4.9 | 3.6 | 2.3 U | 2.3 U |
| surface | Aldrin (ug/kg) | 1 | 0 | 0 | | | | | | 0.42 U | 0.42 U | 0.42 | 0.42 U | 0.42 U |
| surface | alpha-Hexachlorocyclohexane (ug/kg) | 1 | 0 | 0 | | | | | | 0.19 U | 0.19 U | 0.19 | 0.19 U | 0.19 U |
| surface | beta-Hexachlorocyclohexane (ug/kg) | 1 | 0 | 0 | | | | | | 4.9 U | 4.9 U | 4.9 | 4.9 U | 4.9 U |
| surface | delta-Hexachlorocyclohexane (ug/kg) | 1 | 0 | 0 | | | | | | 0.19 U | 0.19 U | 0.19 | 0.19 U | 0.19 U |
| surface | gamma-Hexachlorocyclohexane (ug/kg) | 1 | 0 | 0 | | | | | | 0.19 U | 0.19 U | 0.19 | 0.19 U | 0.19 U |
| surface | cis-Chlordane (ug/kg) | 1 | 0 | 0 | | | | | | 0.19 U | 0.19 U | 0.19 | 0.19 U | 0.19 U |
| surface | trans-Chlordane (ug/kg) | 1 | 0 | 0 | | | | | | 0.19 U | 0.19 U | 0.19 | 0.19 U | 0.19 U |
| surface | Oxychlordane (ug/kg) | 1 | 0 | 0 | | | | | | 0.38 U | 0.38 U | 0.38 | 0.38 U | 0.38 U |
| surface | cis-Nonachlor (ug/kg) | 1 | 0 | 0 | | | | | | 0.38 U | 0.38 U | 0.38 | 0.38 U | 0.38 U |
| surface | trans-Nonachlor (ug/kg) | 1 | 0 | 0 | | | | | | 0.38 U | 0.38 U | 0.38 | 0.38 U | 0.38 U |
| surface | Dieldrin (ug/kg) | 1 | 0 | 0 | | | | | | 0.38 U | 0.38 U | 0.38 | 0.38 U | 0.38 U |
| surface | alpha-Endosulfan (ug/kg) | 1 | 0 | 0 | | | | | | 0.19 U | 0.19 U | 0.19 | 0.19 U | 0.19 U |
| surface | beta-Endosulfan (ug/kg) | 1 | 0 | 0 | | | | | | 0.38 U | 0.38 U | 0.38 | 0.38 U | 0.38 U |
| surface | Endosulfan sulfate (ug/kg) | 1 | 0 | 0 | | | | | | 0.38 U | 0.38 U | 0.38 | 0.38 U | 0.38 U |
| surface | Endrin (ug/kg) | 1 | 0 | 0 | | | | | | 0.38 U | 0.38 U | 0.38 | 0.38 U | 0.38 U |
| surface | Endrin aldehyde (ug/kg) | 1 | 0 | 0 | | | | | | 0.38 U | 0.38 U | 0.38 | 0.38 U | 0.38 U |
| surface | Endrin ketone (ug/kg) | 1 | 0 | 0 | | | | | | 1.1 U | 1.1 U | 1.1 | 1.1 U | 1.1 U |
| surface | Heptachlor (ug/kg) | 1 | 0 | 0 | | | | | | 0.19 U | 0.19 U | 0.19 | 0.19 U | 0.19 U |
| surface | Heptachlor epoxide (ug/kg) | 1 | 0 | 0 | | | | | | 0.19 U | 0.19 U | 0.19 | 0.19 U | 0.19 U |
| surface | Methoxychlor (ug/kg) | 1 | 0 | 0 | | | | | | 1.9 U | 1.9 U | 1.9 | 1.9 U | 1.9 U |
| surface | Mirex (ug/kg) | 1 | 0 | 0 | | | | | | 2.2 U | 2.2 U | 2.2 | 2.2 U | 2.2 U |
| surface | Toxaphene (ug/kg) | 1 | 0 | 0 | | | | | | 45 U | 45 U | 45 | 45 U | 45 U |
| surface | 2,3,4,6-Tetrachlorophenol (ug/kg) | 2 | 0 | 0 | | | | | | 96 U | 98 U | 97 | 96 U | 96 U |
| surface | 2,4,5-Trichlorophenol (ug/kg) | 3 | 0 | 0 | | | | | | 96 U | 99 U | 97.7 | 98 U | 98 U |
| surface | 2,4,6-Trichlorophenol (ug/kg) | 3 | 0 | 0 | | | | | | 96 U | 99 U | 97.7 | 98 U | 98 U |
| surface | 2,4-Dichlorophenol (ug/kg) | 3 | 0 | 0 | | | | | | 58 U | 60 U | 59 | 59 U | 59 U |
| surface | 2,4-Dimethylphenol (ug/kg) | 3 | 0 | 0 | | | | | | 20 U | 59 U | 45.7 | 58 U | 58 U |
| surface | 2,4-Dinitrophenol (ug/kg) | 3 | 0 | 0 | | | | | | 190 UJ | 200 UJ | 197 | 200 UJ | 200 UJ |
| surface | 2-Chlorophenol (ug/kg) | 3 | 0 | 0 | | | | | | 19 U | 20 U | 19.7 | 20 U | 20 U |
| surface | 2-Methylphenol (ug/kg) | 3 | 0 | 0 | | | | | | 19 U | 20 U | 19.7 | 20 U | 20 U |
| surface | 2-Nitrophenol (ug/kg) | 3 | 0 | 0 | | | | | | 96 U | 99 U | 97.7 | 98 U | 98 U |
| surface | 4,6-Dinitro-2-methylphenol (ug/kg) | 3 | 0 | 0 | | | | | | 190 UJ | 200 U | 197 | 200 UJ | 200 UJ |

Table 2. Queried Sediment Chemistry Data

| Surface or Subsurface | Analyte | Number of Samples | Number Detected | % Detected | Detected Concentrations | | | | | Detected and Nondetected Concentrations | | | | |
|--------------------------|---|----------------------|--------------------|---------------|-------------------------|---------|------|--------|-------|---|---------|------|--------|-------|
| | | | | | Minimum | Maximum | Mean | Median | 95th | Minimum | Maximum | Mean | Median | 95th |
| surface | 4-Chloro-3-methylphenol (ug/kg) | 3 | 0 | 0 | | | | | | 38 U | 40 U | 39 | 39 U | 39 U |
| surface | 4-Methylphenol (ug/kg) | 3 | 1 | 33.3 | 230 | 230 | 230 | 230 | 230 | 19 U | 230 | 89.7 | 20 U | 20 U |
| surface | 4-Nitrophenol (ug/kg) | 3 | 0 | 0 | | | | | | 96 U | 99 U | 97.7 | 98 U | 98 U |
| surface | Pentachlorophenol (ug/kg) | 3 | 1 | 33.3 | 41 M | 41 M | 41 | 41 M | 41 M | 19 U | 99 UJ | 53 | 41 M | 41 M |
| surface | Phenol (ug/kg) | 3 | 0 | 0 | | | | | | 20 U | 39 U | 32.3 | 38 U | 38 U |
| surface | 2,3,4,5-Tetrachlorophenol (ug/kg) | 2 | 0 | 0 | | | | | | 96 U | 98 U | 97 | 96 U | 96 U |
| surface | 2,3,5,6-Tetrachlorophenol (ug/kg) | 2 | 0 | 0 | | | | | | 96 U | 98 U | 97 | 96 U | 96 U |
| surface | Dimethyl phthalate (ug/kg) | 3 | 0 | 0 | | | | | | 19 U | 20 U | 19.7 | 20 U | 20 U |
| surface | Diethyl phthalate (ug/kg) | 3 | 1 | 33.3 | 48 | 48 | 48 | 48 | 48 | 20 U | 48 | 29.3 | 20 U | 20 U |
| surface | Dibutyl phthalate (ug/kg) | 3 | 2 | 66.7 | 34 | 190 | 112 | 34 | 34 | 20 U | 190 | 81.3 | 34 | 34 |
| surface | Butylbenzyl phthalate (ug/kg) | 3 | 0 | 0 | | | | | | 19 U | 20 U | 19.7 | 20 U | 20 U |
| surface | Di-n-octyl phthalate (ug/kg) | 3 | 0 | 0 | | | | | | 19 U | 20 U | 19.7 | 20 U | 20 U |
| surface | Bis(2-ethylhexyl) phthalate (ug/kg) | 3 | 2 | 66.7 | 84 | 210 | 147 | 84 | 84 | 84 | 210 | 161 | 190 U | 190 U |
| surface | Azobenzene (ug/kg) | 2 | 0 | 0 | | | | | | 19 U | 20 U | 19.5 | 19 U | 19 U |
| surface | Bis(2-chloro-1-methylethyl) ether (ug/kg) | 3 | 0 | 0 | | | | | | 19 U | 20 UJ | 19.7 | 20 U | 20 U |
| surface | 2,4-Dinitrotoluene (ug/kg) | 3 | 0 | 0 | | | | | | 96 U | 99 U | 97.7 | 98 U | 98 U |
| surface | 2,6-Dinitrotoluene (ug/kg) | 3 | 0 | 0 | | | | | | 96 U | 99 U | 97.7 | 98 U | 98 U |
| surface | 2-Chloronaphthalene (ug/kg) | 3 | 0 | 0 | | | | | | 19 U | 20 U | 19.7 | 20 U | 20 U |
| surface | 2-Nitroaniline (ug/kg) | 3 | 0 | 0 | | | | | | 96 U | 99 U | 97.7 | 98 U | 98 U |
| surface | 3,3'-Dichlorobenzidine (ug/kg) | 3 | 0 | 0 | | | | | | 96 U | 99 UJ | 97.7 | 98 U | 98 U |
| surface | 3-Nitroaniline (ug/kg) | 3 | 0 | 0 | | | | | | 120 U | 120 UJ | 120 | 120 U | 120 U |
| surface | 4-Bromophenyl phenyl ether (ug/kg) | 3 | 0 | 0 | | | | | | 19 U | 20 U | 19.7 | 20 U | 20 U |
| surface | 4-Chloroaniline (ug/kg) | 3 | 0 | 0 | | | | | | 58 U | 60 UJ | 59 | 59 U | 59 U |
| surface | 4-Chlorophenyl phenyl ether (ug/kg) | 3 | 0 | 0 | | | | | | 19 U | 20 U | 19.7 | 20 U | 20 U |
| surface | 4-Nitroaniline (ug/kg) | 3 | 0 | 0 | | | | | | 96 U | 99 UJ | 97.7 | 98 U | 98 U |
| surface | Aniline (ug/kg) | 2 | 0 | 0 | | | | | | 19 U | 20 U | 19.5 | 19 U | 19 U |
| surface | Benzonic acid (ug/kg) | 3 | 1 | 33.3 | 260 J | 260 J | 260 | 260 J | 260 J | 190 UJ | 260 J | 217 | 200 U | 200 U |
| surface | Benzyl alcohol (ug/kg) | 3 | 0 | 0 | | | | | | 20 UJ | 98 U | 71.3 | 96 U | 96 U |
| surface | Bis(2-chloroethoxy) methane (ug/kg) | 3 | 0 | 0 | | | | | | 19 U | 20 U | 19.7 | 20 U | 20 U |
| surface | Bis(2-chloroethyl) ether (ug/kg) | 3 | 0 | 0 | | | | | | 38 U | 40 U | 39 | 39 U | 39 U |
| surface | Carbazole (ug/kg) | 3 | 3 | 100 | 5.4 | 1000 J | 368 | 99 J | 99 J | 5.4 | 1000 J | 368 | 99 J | 99 J |
| surface | Dibenzofuran (ug/kg) | 3 | 2 | 66.7 | 33 | 220 | 127 | 33 | 33 | 3.8 U | 220 | 85.6 | 33 | 33 |
| surface | Hexachlorobenzene (ug/kg) | 3 | 0 | 0 | | | | | | 0.19 U | 20 U | 13.4 | 20 U | 20 U |
| surface | Hexachlorobutadiene (ug/kg) | 3 | 0 | 0 | | | | | | 0.54 U | 39 U | 19.8 | 20 U | 20 U |
| surface | Hexachlorocyclopentadiene (ug/kg) | 3 | 0 | 0 | | | | | | 96 U | 99 UJ | 97.7 | 98 U | 98 U |
| surface | Hexachloroethane (ug/kg) | 3 | 0 | 0 | | | | | | 3.8 U | 20 U | 9.9 | 5.9 U | 5.9 U |
| surface | Isophorone (ug/kg) | 3 | 0 | 0 | | | | | | 19 U | 20 U | 19.7 | 20 U | 20 U |
| surface | Nitrobenzene (ug/kg) | 3 | 0 | 0 | | | | | | 19 U | 20 U | 19.7 | 20 UJ | 20 UJ |
| surface | N-Nitrosodimethylamine (ug/kg) | 2 | 0 | 0 | | | | | | 96 U | 98 U | 97 | 96 U | 96 U |
| surface | N-Nitrosodipropylamine (ug/kg) | 3 | 0 | 0 | | | | | | 38 U | 40 U | 39 | 39 U | 39 U |
| surface | N-Nitrosodiphenylamine (ug/kg) | 3 | 0 | 0 | | | | | | 19 U | 20 U | 19.7 | 20 U | 20 U |

LWG

Lower Willamette Group

Portland Harbor RI/FS
Crawford Street Corp CSM Site Summary
March 4, 2005
DRAFT

Table 2. Queried Sediment Chemistry Data

| Surface or Subsurface | Analyte | Number of Samples | Number Detected | % Detected | Detected Concentrations | | | | | Detected and Nondetected Concentrations | | | | |
|--------------------------|--------------------------------|----------------------|--------------------|---------------|-------------------------|---------|------|--------|------|---|---------|------|--------|------|
| | | | | | Minimum | Maximum | Mean | Median | 95th | Minimum | Maximum | Mean | Median | 95th |
| surface | 1,2-Dichlorobenzene (ug/kg) | 3 | 0 | 0 | | | | | | 19 U | 20 U | 19.7 | 20 U | 20 U |
| surface | 1,3-Dichlorobenzene (ug/kg) | 3 | 0 | 0 | | | | | | 19 U | 20 U | 19.7 | 20 U | 20 U |
| surface | 1,4-Dichlorobenzene (ug/kg) | 3 | 0 | 0 | | | | | | 19 U | 20 U | 19.7 | 20 U | 20 U |
| surface | 1,2,4-Trichlorobenzene (ug/kg) | 3 | 0 | 0 | | | | | | 19 U | 20 U | 19.7 | 20 U | 20 U |

SUPPLEMENTAL FIGURES

- Figure 2-1. Site Plan (Bridgewater 2000)
- Figure 1. Shoreline Features (Bridgewater 2001)
- Figure 2-4. Columbia Forge Site Plan (Bridgewater 2000)
- Figure 2-1. PA Sampling Locations (Bridgewater 2002b)
- Figure 3-1. Historical Site Features (Bridgewater 2000)
- Figure 3. Historical Site Features (SE/E 1988)
- Figure 3-1. Black Sand Removal Areas (Bridgewater 2002a)
- Figure 4-1. Post-Removal Soil Sample Locations (Bridgewater 2002a)
- Figure 4-2. Post-Removal Soil Analytical Results (Bridgewater 2002a)

DO NOT QUOTE OR CITE

This document is currently under review by US EPA and its federal, state, and tribal partners, and is subject to change in whole or in part

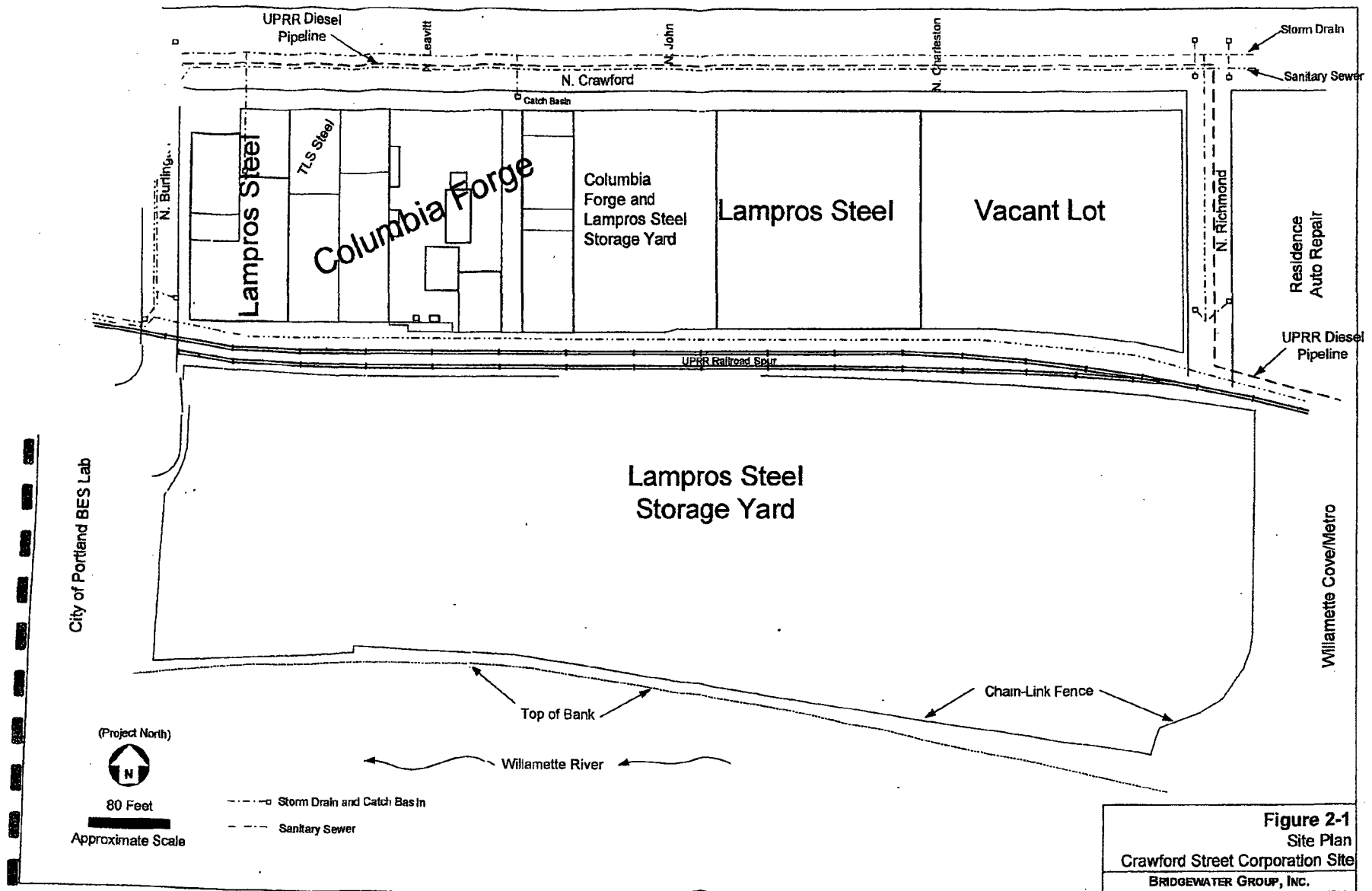


Figure 2-1
Site Plan
Crawford Street Corporation Site
BRIDGEWATER GROUP, INC.

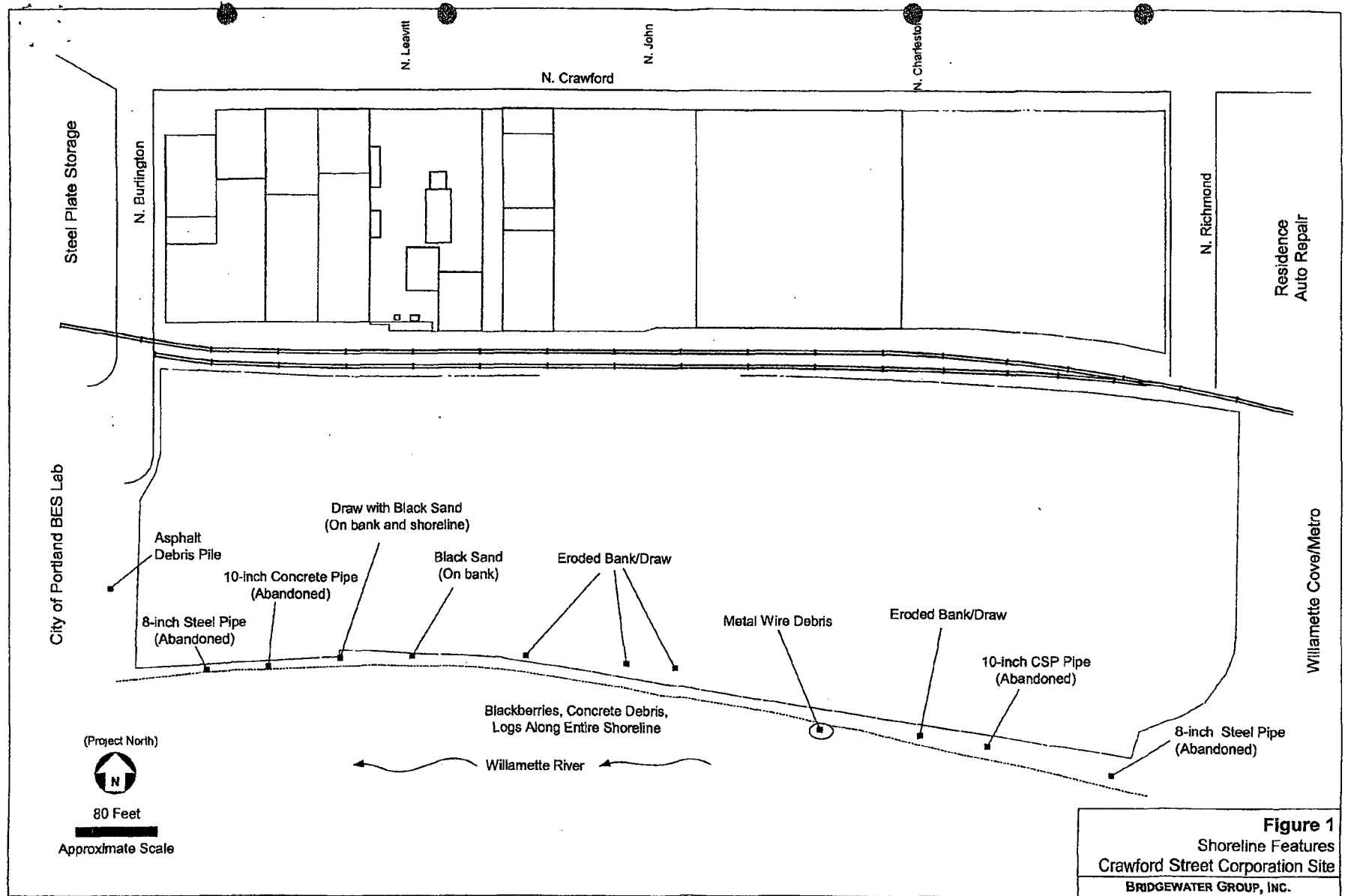


Figure 1
Shoreline Features
Crawford Street Corporation Site
BRIDGEWATER GROUP, INC.

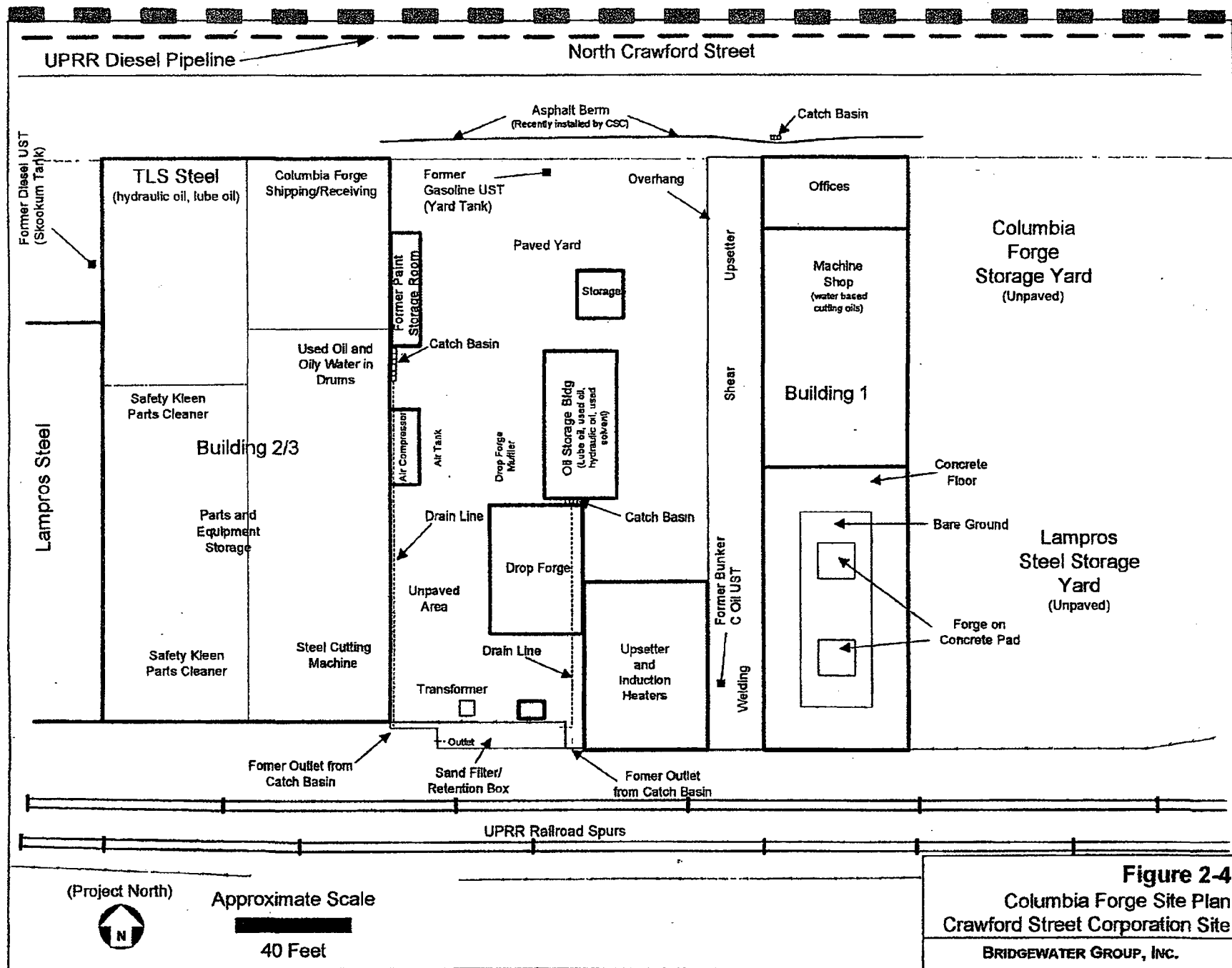
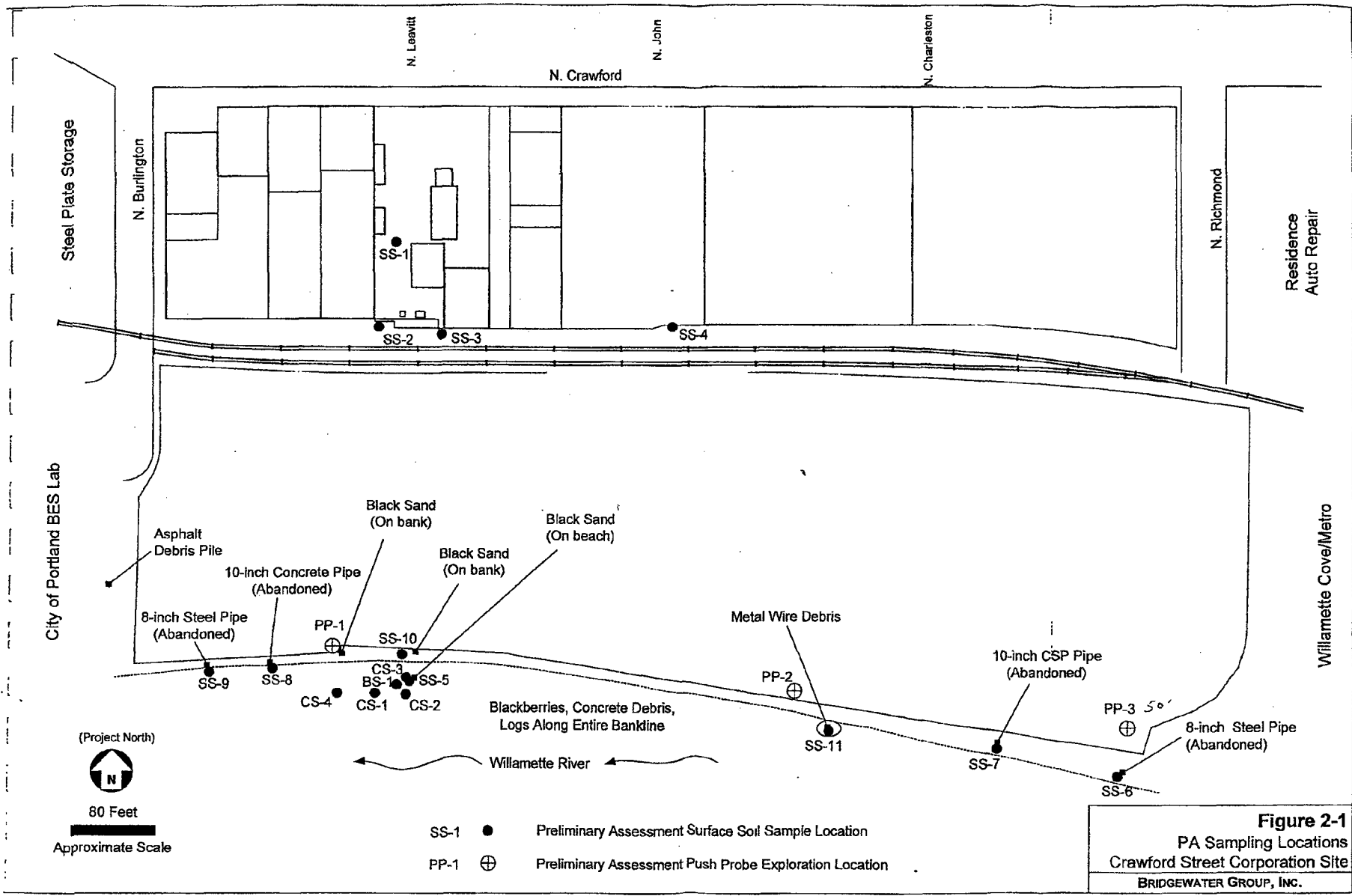
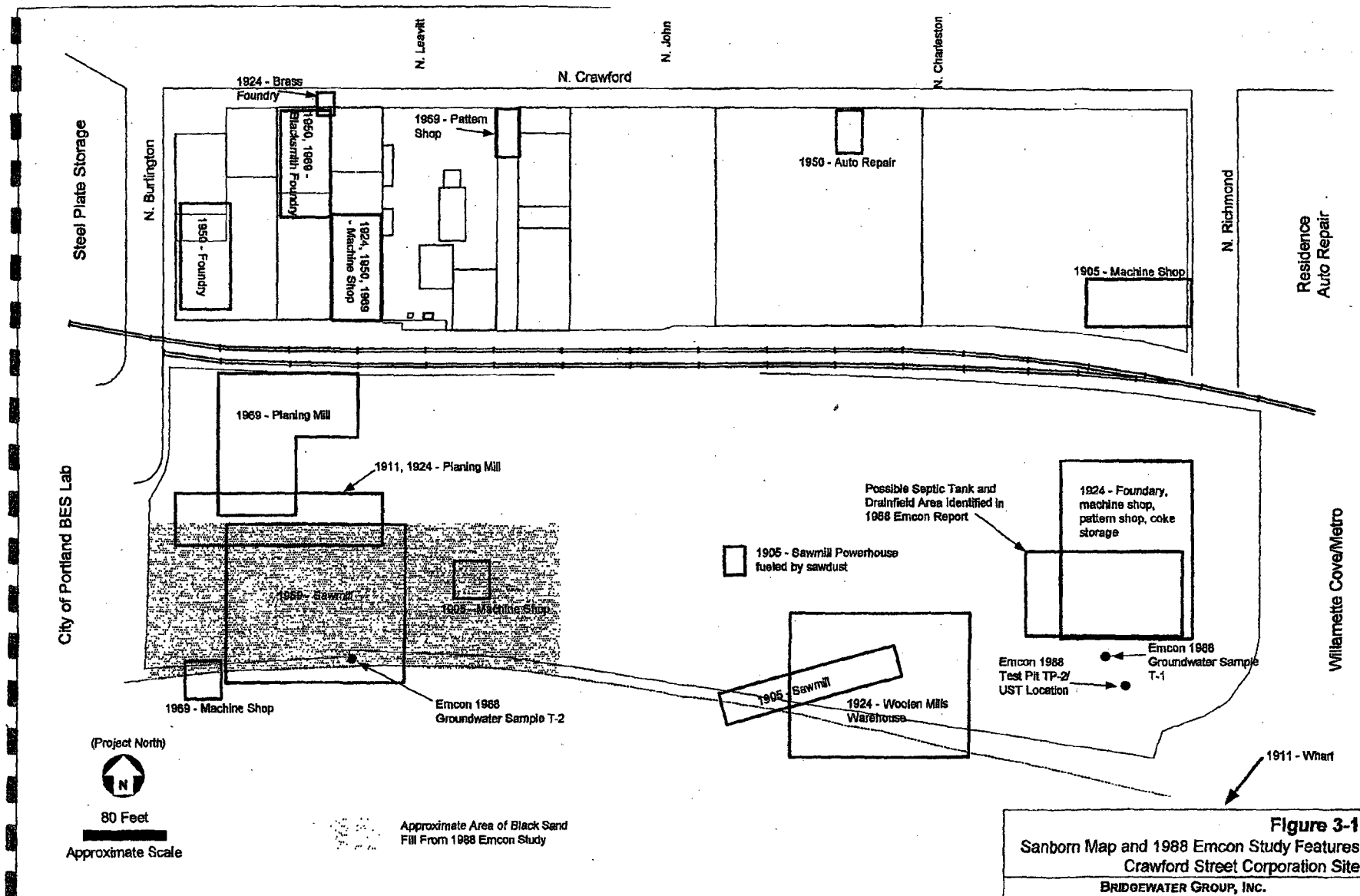
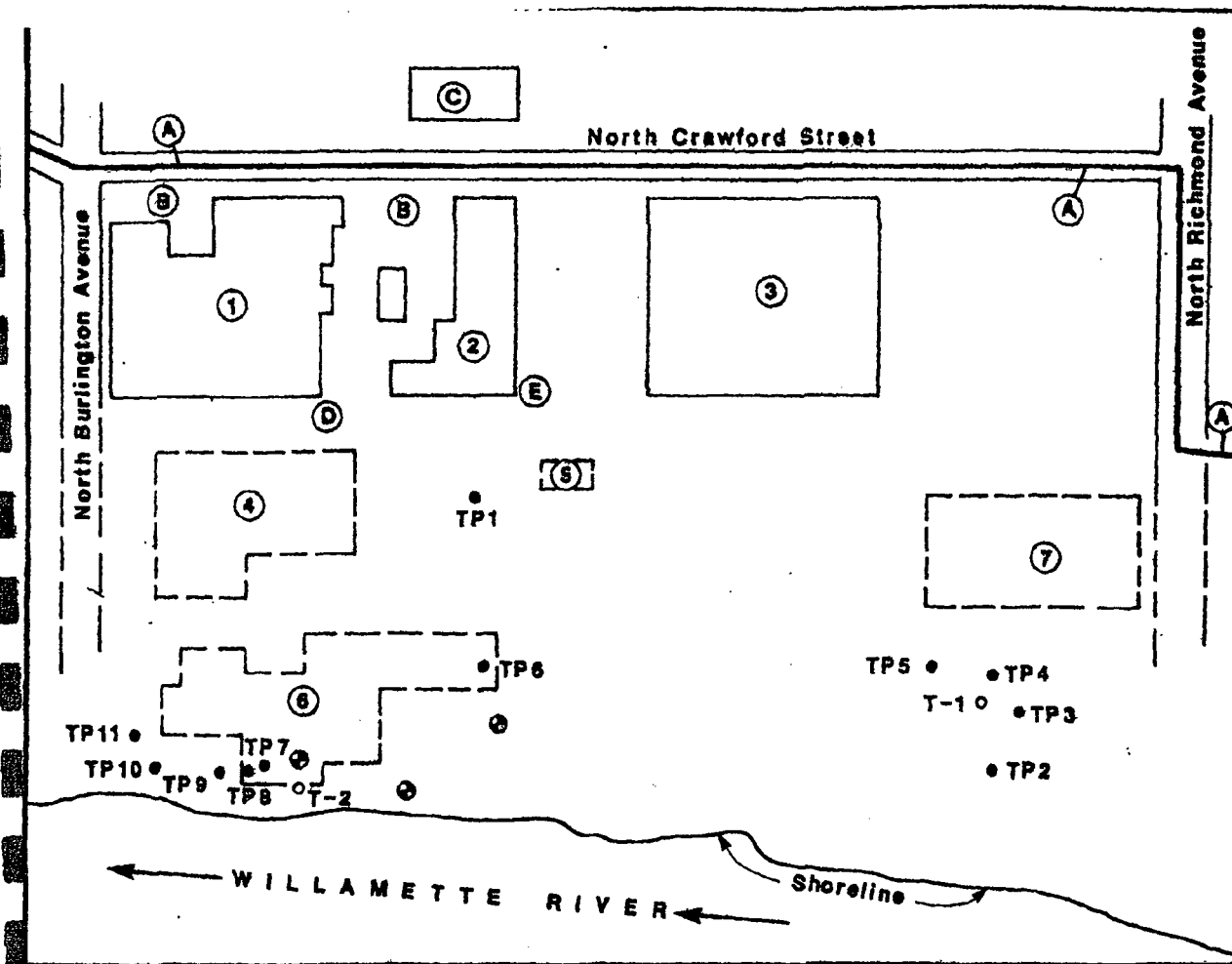


Figure 2-4
Columbia Forge Site Plan
Crawford Street Corporation Site
BRIDGEWATER GROUP, INC.







EXPLANATION

POTENTIAL OFFSITE CONTAMINANT SOURCES

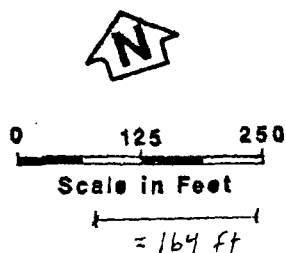
- (A) 8-inch Union Pacific Railroad diesel pipeline
- (B) Former underground storage tanks
- (C) Underground storage tank and steamcleaning area, St. Johns Truck Service
- (D) Oily soil and surface water runoff
- (E) Compressor-blowdown oil, Columbia Forge

CURRENT AND FORMER (F) BUSINESS BUILDING

- (1) Skookum (F), Asset Recovery, Columbia Forge
- (2) Columbia Forge
- (3) Dry Shed (F), warehouse
- (4) Planing Mill (F)
- (5) Chip Bin (F)
- (6) Sawmill (F)
- (7) Wool Scouring (F), plywood storage (F), "Fibron Insulation" (F)

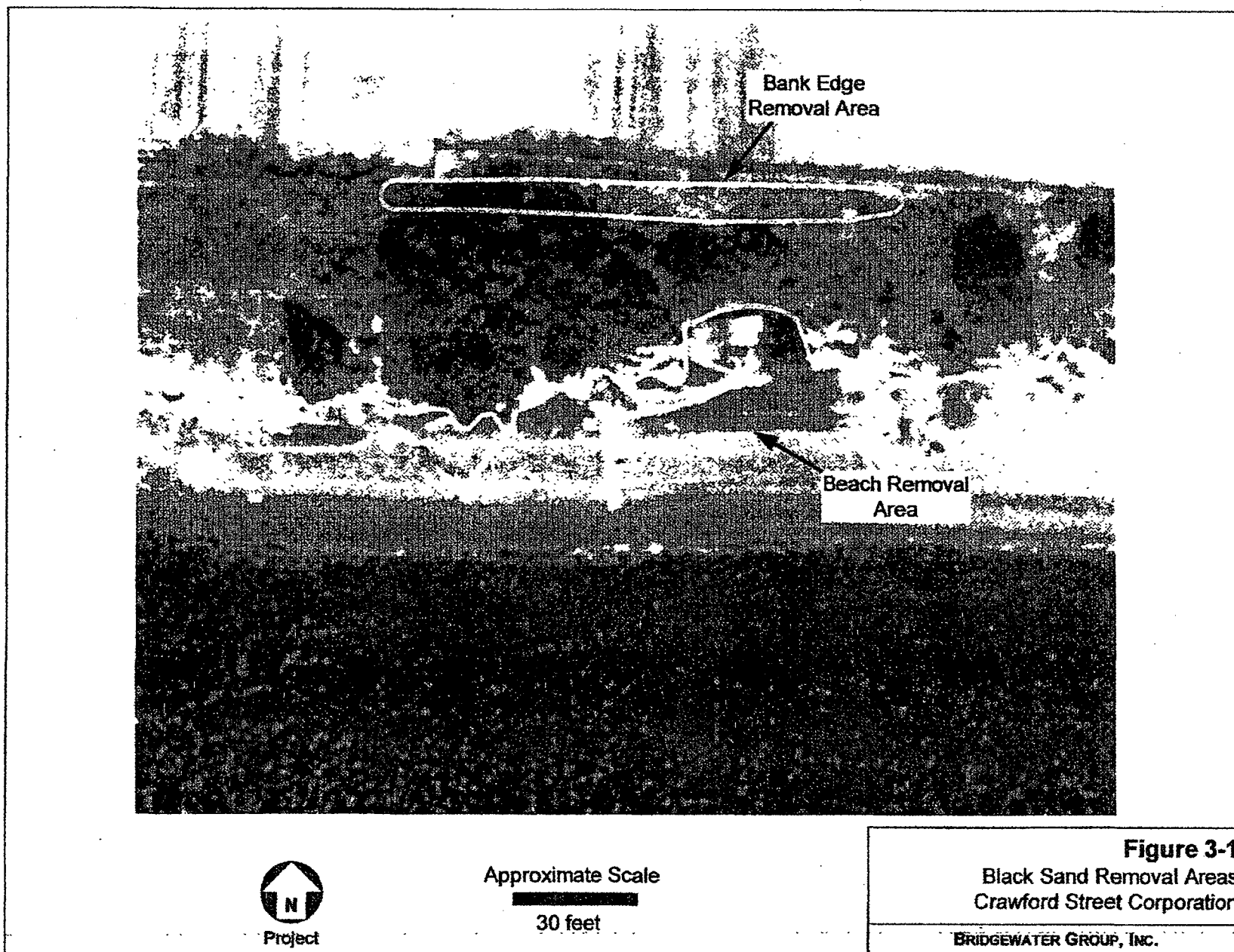
SAMPLE SITES

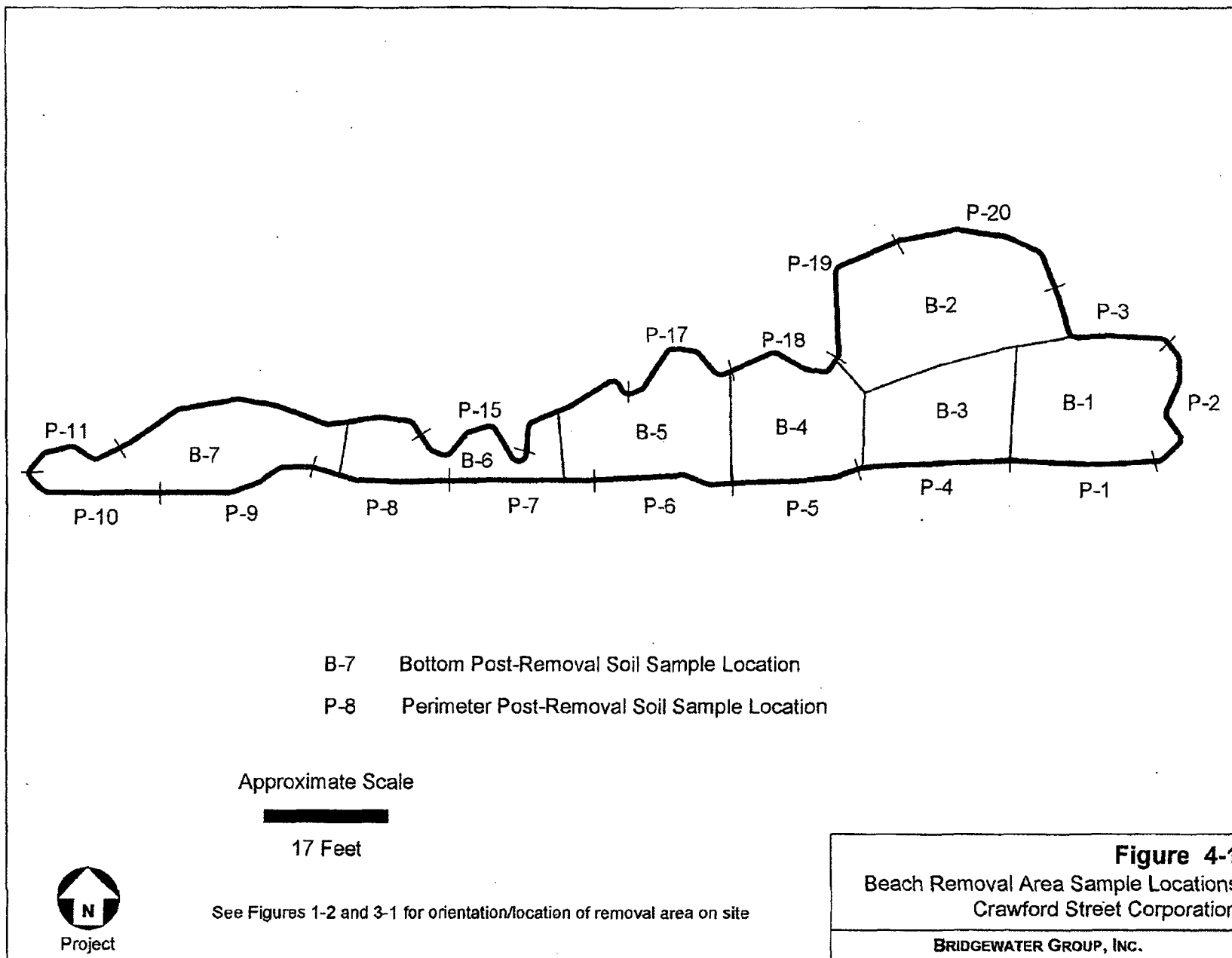
- Surface grab sample of sand fill. Samples composited for EP Toxicity Testing.
- Test Pit
- Test Boring

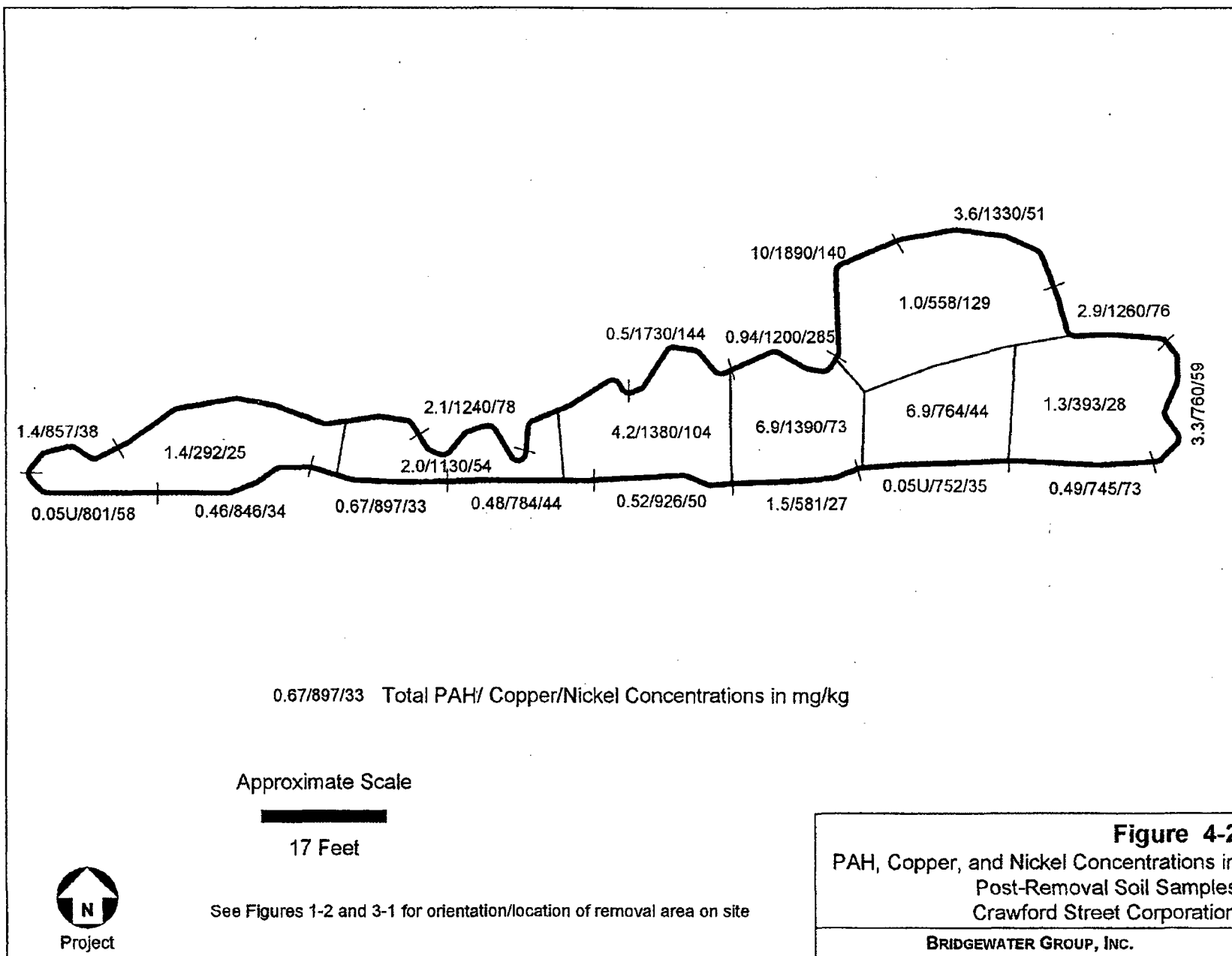


| | |
|-----------------------------|---------------|
| MMI (Lampros Steel Site) | |
| Site Map | |
| Sweet-Edwards / EMCON, Inc. | |
| DRAWN BY | INITIALS DATE |
| CHECKED BY | 2/2/86 |
| REVISED | |

Figure 3







SUPPLEMENTAL TABLES

Table 3 and Figure 2. Historical Property Ownership (SE/E 1988)
Tables 2-1 through 2-4. Chemical Concentrations in Soil Samples (Bridgewater 2002b)
Tables 4-1 through 4-5. Concentrations in Removal Area Soil Samples (Bridgewater 2002a)

DO NOT QUOTE OR CITE

This document is currently under review by US EPA and its federal, state, and tribal partners, and is subject to change in whole or in part

TABLE 3
LIST OF PAST ONSITE PROPERTY OWNERSHIP
BY BUSINESSES

Block 1

Oregon Barrel Co., Marine Iron Works, Star Sand Co., American Marine Iron Works, Western Wool Warehouse, Portland Manufacturing Co., Portland Wood Products, Portland Woolen Mills, Lawrence Warehouse Co.

Block 2

Oregon Barrel Co., Central Lumber Co., Marine Iron Works, St. Johns Lumber Co., Marine Iron Works, American Marine Iron Works, Western Wool Warehouse, Beaver-Linnton Mills, L.B. Menefee Lumber Co., Lawrence Warehouse Co., Portland Woolen Mills, Portland Spruce Mills

Block 3

Central Lumber Co., St. Johns Lumber Co., Beaver-Linnton Mills, L.B. Menefee Lumber Co., Portland Spruce Mills, Skookum (logging equipment), Portland Lumber Co., Portland Manufacturing Co., Simpson Lumber Co.

Block 4

St. Johns Lumber Co., Beaver-Linnton Mills, Portland Lumber Mills, Portland Manufacturing Co., Portland Spruce Mills

Block 7

Portland General Electric, Portland Railway, Light and Power Co., Peninsula Iron Works, Portland Lumber Mills, Brand S Corp.

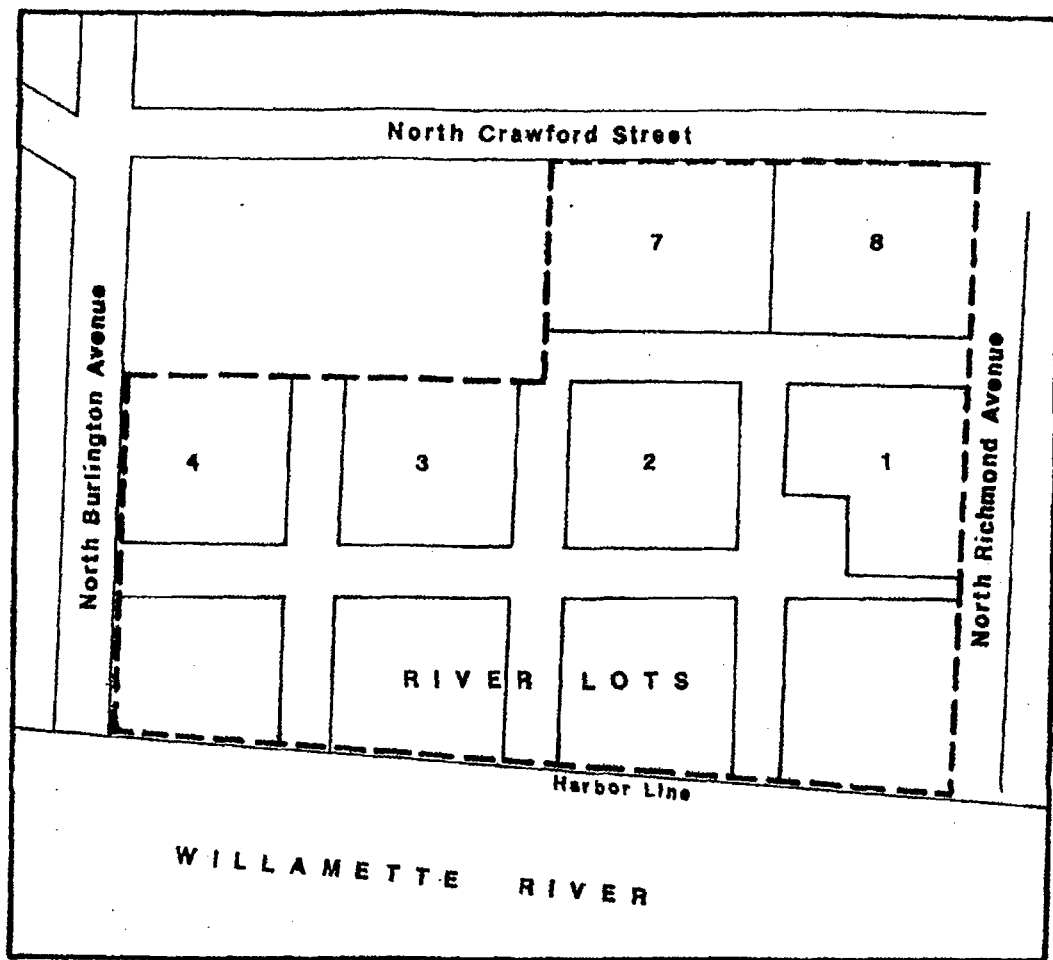
Block 8

Portland Steel Shipbuilding, Portland Stove and Range Manufacturing Co., Portland Lumber Mills

River Lots

Oregon Barrel Co., Central Lumber Co., Marine Iron Works, American Marine Iron Works, St. Johns Lumber Co., Western Wool Warehouse, Beaver-Linnton Mills, L.B. Menefee Lumber Co., Portland Manufacturing Co., Portland Spruce Mills, Portland Wood Products Co.

LAMP2-T3.226



EXPLANATION

----- Site Boundary



| | | |
|-----------------------------|----------|--------|
| MMI (Lampros Steel Site) | | |
| Block and Lot Locations | | |
| Sweet-Edwards / EMCON, Inc. | | |
| DRAWN BY | INITIALS | DATE |
| CHECKED BY | | 2/2/58 |
| REVISED | | |

Figure 2

Table 2-1**Chemical Concentrations in Soil Samples - Petroleum Hydrocarbons
Crawford Street**

All results in mg/kg

| Sample | Location | Date | Sample Depth (ft) | Gasoline | Diesel | Heavy oil |
|---------|--------------------------------|-----------|-------------------|----------|--------|-----------|
| SS-01 | Columbia Forge Yard | 4/26/2001 | 0.5 | 4 U | 250 U | 3130 |
| SS-02 | Railroad drainage | 4/26/2001 | 0.5 | 4 U | 1000 U | 13500 |
| SS-03 | Railroad drainage | 4/26/2001 | 0.5 | 4 U | 250 U | 5350 |
| SS-04 | Railroad drainage | 4/26/2001 | 0.5 | 4 U | 500 U | 6350 |
| | | | | | | |
| PP-1-24 | Waterfront boring - west | 4/25/2001 | 24.0 | 4 U | 25 U | 50 U |
| PP-2-20 | Waterfront boring - middle | 4/24/2001 | 20.0 | 4.84 | 25 U | 50 U |
| PP-3-24 | Waterfront boring - east | 4/24/2001 | 24.0 | 4 U | 25 U | 50 U |
| | | | | | | |
| SS-06 | Pipe outfall | 4/24/2001 | 0.5 | 4.8 | 25 U | 50 U |
| SS-07 | Pipe outfall | 4/24/2001 | 0.5 | 4 U | 31.7 | 70.4 |
| SS-09 | Pipe outfall | 4/24/2001 | 0.5 | 4 U | 25 U | 50 U |
| | | | | | | |
| SS-05 | Black sand - beach | 4/24/2001 | 0.5 | 4 U | 25 U | 50 U |
| SS-10 | Black sand - bank | 4/26/2001 | 2.0 | 4 U | 78.3 | 180 |
| SS-08 | Pipe outfall (black sand area) | 4/24/2001 | 0.5 | 4 U | 25 U | 194 |
| BS-1A | Black sand - beach | 6/22/2001 | 0.5 | NA | NA | NA |
| BS-1B | Black sand - beach | 6/22/2001 | 0.5 | NA | NA | NA |
| BS-1C | Black sand - beach | 6/22/2001 | 0.5 | NA | NA | NA |
| BS-1D | Black sand - beach | 6/22/2001 | 0.5 | NA | NA | NA |
| CS-1 | Black sand - beach | 7/17/2001 | 0.5 | NA | NA | NA |
| CS-2 | Black sand - beach | 7/17/2001 | 0.5 | NA | NA | NA |
| CS-3 | Black sand - beach | 7/17/2001 | 0.5 | NA | NA | NA |
| CS-4 | Black sand - beach | 7/17/2001 | 0.5 | NA | NA | NA |
| | | | | | | |
| SS-11 | Metal debris - beach | 4/24/2001 | 0.5 | NA | NA | NA |

U - Not detected at noted reporting limit

NA - Not analyzed

Table 2-2
Chemical Concentrations in Soil Samples - SVOCs and PCBs
Crawford Street
All results in mg/kg

| Sample | Location | Date | Sample Depth (ft) | Acenaphthene | Acenaphthylene | Anthracene | Benz(a)anthracene | Benz(a)pyrene | Benz(b)fluoranthene | Benz(g,h,i)perylene | Benz(k)fluoranthene | Chrysene | Dibenz(a,h)anthracene | Fluoranthene | Fluorene | Indeno(1,2,3-cd)pyrene | Naphthalene | Phenanthrene | Pyrene | PAHs | HPAHs | Total PAHs | PCBs |
|------------------------------------|--------------------------------|-----------|-------------------|--------------|----------------|------------|-------------------|---------------|---------------------|---------------------|---------------------|----------|-----------------------|--------------|----------|------------------------|-------------|--------------|---------|-------|-------|------------|-------|
| SS-01 | Columbia Forge Yard | 4/26/2001 | 0.5 | 0.067 U | 0.067 U | 0.067 U | 0.067 U | 0.067 U | 0.123 | 0.0953 | 0.068 | 0.11 | 0.067 U | 0.086 | 0.67 U | 0.067 U | 0.067 U | 0.067 U | 0.092 | | 0.574 | 0.574 | NA |
| SS-02 | Railroad drainage | 4/26/2001 | 0.5 | 0.134 U | 0.134 U | 0.134 U | 2.68 U | 0.67 U | 0.67 U | 0.67 U | 0.67 U | 2.68 U | 0.67 U | 1.34 U | 0.67 U | 0.67 U | 0.134 U | 0.134 U | 2.68 U | | | | NA |
| SS-03 | Railroad drainage | 4/26/2001 | 0.5 | 0.67 U | 0.67 U | 0.67 U | 0.67 U | 0.67 U | 0.67 U | 0.67 U | 0.67 U | 0.67 U | 0.67 U | 0.67 U | 0.67 U | 0.67 U | 0.67 U | 0.67 U | 0.67 U | | | | NA |
| SS-04 | Railroad drainage | 4/26/2001 | 0.5 | 0.168 U | 0.168 U | 0.168 U | 0.259 | 0.401 | 0.568 | 0.486 | 0.34 | 0.438 | 0.168 U | 0.384 | 0.168 U | 0.379 | 0.168 U | 0.224 | 0.314 | 0.224 | 3.791 | 4.015 | NA |
| PP-1-24 | Waterfront boring - west | 4/25/2001 | 24.0 | 0.33 U | 0.33 U | 0.33 U | 0.33 U | 0.33 U | 0.33 U | 0.33 U | 0.33 U | 0.33 U | 0.33 U | 0.33 U | 0.33 U | 0.33 U | 0.33 U | 0.33 U | 0.33 U | | | | NA |
| PP-2-20 | Waterfront boring - middle | 4/24/2001 | 20.0 | 0.33 U | 0.33 U | 0.33 U | 0.33 U | 0.33 U | 0.33 U | 0.33 U | 0.33 U | 0.33 U | 0.33 U | 0.33 U | 0.33 U | 0.33 U | 0.33 U | 0.33 U | 0.33 U | | | | NA |
| PP-3-24 | Waterfront boring - east | 4/24/2001 | 24.0 | 0.013 U | 0.013 U | 0.0134 U | 0.0134 U | 0.0134 U | 0.0134 U | 0.0134 U | 0.013 U | 0.013 U | 0.013 U | 0.013 U | 0.013 U | 0.013 U | 0.013 U | 0.013 U | 0.013 U | | | | NA |
| SS-06 | Pipe outfall | 4/24/2001 | 0.5 | 0.33 U | 0.33 U | 0.33 U | 0.33 U | 0.33 U | 0.33 U | 0.33 U | 0.33 U | 0.33 U | 0.33 U | 0.33 U | 0.33 U | 0.33 U | 0.33 U | 0.33 U | 0.334 | 0.33 | | 0.33 | NA |
| SS-07 | Pipe outfall | 4/24/2001 | 0.5 | 0.33 U | 0.33 U | 0.33 U | 0.33 U | 0.33 U | 0.33 U | 0.33 U | 0.33 U | 0.33 U | 0.33 U | 0.33 U | 0.33 U | 0.33 U | 0.33 U | 0.33 U | 0.33 U | | | | NA |
| SS-09 | Pipe outfall | 4/24/2001 | 0.5 | 0.33 U | 0.33 U | 0.33 U | 0.33 U | 0.33 U | 0.33 U | 0.33 U | 0.33 U | 0.33 U | 0.33 U | 0.33 U | 0.33 U | 0.33 U | 0.33 U | 0.33 U | 0.33 U | | | | NA |
| SS-05 | Black sand - beach | 4/24/2001 | 0.5 | 0.067 U | 0.067 U | 0.067 U | 0.0683 | 0.0828 | 0.0811 | 0.0742 | 0.072 | 0.084 | 0.067 U | 0.144 | 0.067 U | 0.087 U | 0.067 U | 0.168 | 0.127 | 0.168 | 0.901 | 1.069 | 0.224 |
| SS-10 | Black sand - bank | 4/26/2001 | 2.0 | 0.096 | 0.67 U | 0.192 | 0.498 | 0.768 | 0.728 | 0.573 | 0.682 | 0.632 | 0.168 | 0.827 | 0.100 | 0.515 | 0.067 U | 0.658 | 0.742 | 1.046 | 6.233 | 7.279 | 1.11 |
| SS-08 | Pipe outfall (black sand area) | 4/24/2001 | 0.5 | 0.33 U | 0.33 U | 0.33 U | 0.33 U | 0.33 U | 0.33 U | 0.33 U | 0.33 U | 0.33 U | 0.33 U | 0.33 U | 0.33 U | 0.33 U | 0.33 U | 0.33 U | 0.33 U | NA | NA | NA | NA |
| BS-1A | Black sand - beach | 6/22/2001 | 0.5 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| BS-1B | Black sand - beach | 6/22/2001 | 0.5 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| BS-1C | Black sand - beach | 6/22/2001 | 0.5 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| BS-1D | Black sand - beach | 6/22/2001 | 0.5 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| CS-1 | Black sand - beach | 7/17/2001 | 0.5 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| CS-2 | Black sand - beach | 7/17/2001 | 0.5 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| CS-3 | Black sand - beach | 7/17/2001 | 0.5 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| CS-4 | Black sand - beach | 7/17/2001 | 0.5 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| SS-11 | Metal debris - beach | 4/24/2001 | 0.5 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | | | | NA |
| DEQ Soil Screening Level Value | | | | 20 | | | | | | | | | | 30 | | | | | | | | | |
| DEQ Sediment Screening Level Value | | | | 0.29 | 0.16 | 0.097 | 0.032 | 0.032 | | 0.3 | 0.027 | 0.057 | 0.033 | 0.111 | 0.077 | 0.017 | 0.176 | 0.042 | 0.053 | 0.076 | 0.193 | 1.61 | 0.034 |
| McDonald Consensus TECs (sediment) | | | | | | 0.0572 | 0.108 | 0.15 | | | | 0.168 | 0.033 | 0.423 | 0.077 | | 0.176 | 0.204 | 0.195 | | | 1.61 | 0.06 |
| McDonald Consensus PECs (sediment) | | | | | | 0.845 | 1.05 | 1.45 | | | | 1.29 | | 2.23 | 0.536 | | 0.561 | 1.17 | 1.52 | | | 22.8 | 0.676 |
| NOAA SORT TEL (sediment) | | | | | | | 0.0317 | 0.0319 | | | | 0.057 | | 0.111 | | | | 0.042 | 0.053 | | | | 0.034 |
| EPA PRG (Industrial) | | | | 38000 | | 100000 | 2.9 | 0.29 | 2.9 | | 29 | 290 | 0.29 | 30000 | 33000 | 2.9 | 190 | | 64000 | | | | 1 |
| DEQ Generic Remedy (Industrial) | | | | | | | | | | | | | | | | | | | | | | | 7.5 |

U - Not detected at noted reporting limit
NA - Not analyzed

Table 2-3
Chemical Concentrations in Soil Samples - Total Metals
Crawford Street
 All results in mg/kg

| Sample | Location | Date | Sample Depth (ft) | Antimony | Arsenic | Beryllium | Cadmium | Chromium | Copper | Lead | Mercury | Nickel | Selenium | Silver | Thallium | Zinc |
|---------|--------------------------------|-----------|-------------------|----------|---------|-----------|---------|----------|--------|------|---------|--------|----------|--------|----------|--------|
| SS-01 | Columbia Forge Yard | 4/26/2001 | 0.5 | 3.32 | 15.5 | 0.5 U | 3.05 | 390 | 612 | 124 | 0.1 U | 1240 | 0.5 U | 1 U | 0.5 U | 265 |
| SS-02 | Railroad drainage | 4/26/2001 | 0.5 | 1.18 | 10.9 | 0.815 | 0.5 U | 812 | 136 | 106 | 0.1 U | 81 | 0.846 | 1 U | 0.5 U | 246 |
| SS-03 | Railroad drainage | 4/26/2001 | 0.5 | 1.3 | 18.4 | 0.5 U | 2.43 | 125 | 247 | 123 | 0.1 U | 409 | 0.588 | 1 U | 0.5 U | 526 |
| SS-04 | Railroad drainage | 4/26/2001 | 0.5 | 0.918 | 9.69 | 0.5 U | 0.814 | 48.7 | 172 | 184 | 0.136 | 62 | 0.502 | 1 U | 0.5 U | 375 |
| PP-1-24 | Waterfront boring - west | 4/25/2001 | 24.0 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| PP-2-20 | Waterfront boring - middle | 4/24/2001 | 20.0 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| PP-3-24 | Waterfront boring - east | 4/24/2001 | 24.0 | 0.5 U | 8.08 | 0.647 | 0.5 U | 20.7 | 24.4 | 14.7 | 0.1 U | 20.3 | 0.5 U | 0.5 U | 0.5 U | 87.5 |
| SS-06 | Pipe outfall | 4/24/2001 | 0.5 | 0.5 U | 2.91 | 0.563 | 0.5 U | 25.7 | 24.8 | 40.6 | 0.405 | 22 | 0.5 U | 0.5 U | 0.5 U | 22.7 U |
| SS-07 | Pipe outfall | 4/24/2001 | 0.5 | 0.5 U | 5.17 | 0.562 | 0.5 U | 24.4 | 30.2 | 18.1 | 0.13 | 27.7 | 0.5 U | 0.5 U | 0.5 U | 101 |
| SS-09 | Pipe outfall | 4/24/2001 | 0.5 | 0.5 U | 12.7 | 0.693 | 0.5 U | 32.3 | 30.2 | 36.6 | 0.1 U | 25.3 | 0.5 U | 0.5 U | 0.5 U | 122 |
| SS-05 | Black sand - beach | 4/24/2001 | 0.5 | NA | NA | NA | 0.5 U | 202 | NA | 65.3 | 0.1 U | NA | NA | NA | NA | NA |
| SS-10 | Black sand - bank | 4/26/2001 | 2.0 | NA | NA | NA | 0.5 U | 174 | NA | 140 | 0.1 U | NA | NA | NA | NA | NA |
| SS-08 | Pipe outfall (black sand area) | 4/24/2001 | 0.5 | 0.5 U | 5.65 | 0.5 U | 0.5 U | 69 | 170 | 45.6 | 0.167 | 29 | 0.603 | 0.5 U | 0.5 U | 178 |
| BS-1A | Black sand - beach | 6/22/2001 | 0.5 | NA | NA | NA | NA | NA | NA | 52.3 | NA | NA | NA | NA | NA | NA |
| BS-1B | Black sand - beach | 6/22/2001 | 0.5 | NA | NA | NA | NA | NA | NA | 58.9 | NA | NA | NA | NA | NA | NA |
| BS-1C | Black sand - beach | 6/22/2001 | 0.5 | NA | NA | NA | NA | NA | NA | 89 | NA | NA | NA | NA | NA | NA |
| BS-1D | Black sand - beach | 6/22/2001 | 0.5 | NA | NA | NA | NA | NA | NA | 558 | NA | NA | NA | NA | NA | NA |
| CS-1 | Black sand - beach | 7/17/2001 | 0.5 | NA | NA | NA | NA | NA | NA | 42 | NA | NA | NA | NA | NA | NA |
| CS-2 | Black sand - beach | 7/17/2001 | 0.5 | NA | NA | NA | NA | NA | NA | 28 | NA | NA | NA | NA | NA | NA |
| CS-3 | Black sand - beach | 7/17/2001 | 0.5 | NA | NA | NA | NA | NA | NA | 2150 | NA | NA | NA | NA | NA | NA |
| CS-4 | Black sand - beach | 7/17/2001 | 0.5 | NA | NA | NA | NA | NA | NA | 26 | NA | NA | NA | NA | NA | NA |
| SS-11 | Metal debris - beach | 4/24/2001 | 0.5 | NA | 12.6 | NA | NA | 82.7 | 122 | 29.4 | NA | 54.6 | NA | NA | NA | 209 |

Background Concentrations

| | | | | | | | | | | | | | | | | |
|---|--|------|-----|-------|------|-------|-------|-------|------|-------|-------|-------|-----|-------|--|-----|
| Clark County values (upland soil samples) | | 6 | 2 | 1 | 27 | 34 | 17 | 0.04 | 21 | | | | | | | 96 |
| Portland Harbor values (beach samples) | | 5 U | 5 U | 0.7 | 0.6 | 41 | 60 | 30 | 0.1 | 32 | 15 | 1.4 | 13 | | | 116 |
| DEQ Soil Screening Level Value | | 5 | 10 | 10 | 4 | 0.4 | 50 | 16 | 0.1 | 30 | 1 | 2 | 1 | | | 50 |
| DEQ Sediment Screening Level Value | | 3 | 6 | | 0.6 | 37 | 36 | 35 | 0.2 | 18 | | 4.5 | | | | 123 |
| McDonald Consensus TECs (sediment) | | 9.79 | | 0.89 | 43.4 | 31.6 | 35.8 | 0.18 | 22.7 | | | | | | | 121 |
| McDonald Consensus PECs (sediment) | | 33 | | 4.98 | 111 | 149 | 128 | 1.06 | 48.6 | | | | | | | 459 |
| NOAA SQRT TEL (sediment) | | 5.9 | | 0.596 | 37.3 | 35.7 | 35 | 0.174 | 18 | | | | | | | 123 |
| EPA PRG (industrial) | | 820 | 2.7 | 2200 | 810 | 1E+05 | 76000 | 750 | 88 | 41000 | 10000 | 10000 | 130 | 10000 | | |

U - Not detected at noted reporting limit
 NA - Not analyzed

Table 2-4
Chemical Concentrations in Soil Samples - TCLP Metals
Crawford Street
 All results in mg/l

| Sample | Location | Date | Sample Depth (ft) | TCLP Arsenic | TCLP Cadmium | TCLP Chromium | TCLP Copper | TCLP Lead | TCLP Mercury | TCLP Nickel | TCLP Zinc |
|---------|--------------------------------|-----------|-------------------|--------------|--------------|---------------|-------------|-----------|--------------|-------------|-----------|
| SS-01 | Columbia Forge Yard | 4/26/2001 | 0.5 | 0.5 U | 0.5 U | 0.5 U | 0.943 | 0.5 U | NA | 1.07 | 3.22 |
| SS-02 | Railroad drainage | 4/26/2001 | 0.5 | 0.5 U | NA | 0.5 U | 0.5 U | 0.5 U | NA | 0.5 U | 1.27 |
| SS-03 | Railroad drainage | 4/26/2001 | 0.5 | 0.5 U | NA | 0.5 U | 0.5 U | 0.5 U | NA | 0.5 U | 1.4 |
| SS-04 | Railroad drainage | 4/26/2001 | 0.5 | 0.5 U | NA | 0.5 U | 0.5 U | 0.5 U | NA | 0.5 U | 1.83 |
| PP-1-24 | Waterfront boring - west | 4/25/2001 | 24.0 | NA | NA | NA | NA | NA | NA | NA | NA |
| PP-2-20 | Waterfront boring - middle | 4/24/2001 | 20.0 | NA | NA | NA | NA | NA | NA | NA | NA |
| PP-3-24 | Waterfront boring - east | 4/24/2001 | 24.0 | 0.5 U | NA | NA | NA | NA | NA | NA | NA |
| SS-06 | Pipe outfall | 4/24/2001 | 0.5 | NA | NA | NA | NA | 0.5 U | 0.0002 U | NA | NA |
| SS-07 | Pipe outfall | 4/24/2001 | 0.5 | 0.5 U | NA | NA | NA | NA | 0.0002 U | NA | NA |
| SS-09 | Pipe outfall | 4/24/2001 | 0.5 | 0.5 U | NA | NA | NA | 0.5 U | NA | NA | 0.765 |
| SS-05 | Black sand - beach | 4/24/2001 | 0.5 | NA | NA | 0.5 U | NA | 7.39 | NA | NA | NA |
| SS-10 | Black sand - bank | 4/26/2001 | 2.0 | NA | NA | 0.5 | NA | 1.1 | NA | NA | NA |
| SS-08 | Pipe outfall (black sand area) | 4/24/2001 | 0.5 | 0.5 U | NA | 0.5 U | 0.5 U | 0.5 U | 0.0002 U | NA | 1.45 |
| BS-1A | Black sand - beach | 6/22/2001 | 0.5 | NA | NA | NA | NA | 16.8 | NA | NA | NA |
| BS-1B | Black sand - beach | 6/22/2001 | 0.5 | NA | NA | NA | NA | NA | NA | NA | NA |
| BS-1C | Black sand - beach | 6/22/2001 | 0.5 | NA | NA | NA | NA | NA | NA | NA | NA |
| BS-1D | Black sand - beach | 6/22/2001 | 0.5 | NA | NA | NA | NA | NA | NA | NA | NA |
| CS-1 | Black sand - beach | 7/17/2001 | 0.5 | NA | NA | NA | NA | 0.17 | NA | NA | NA |
| CS-2 | Black sand - beach | 7/17/2001 | 0.5 | NA | NA | NA | NA | 0.3 | NA | NA | NA |
| CS-3 | Black sand - beach | 7/17/2001 | 0.5 | NA | NA | NA | NA | 14.2 | NA | NA | NA |
| CS-4 | Black sand - beach | 7/17/2001 | 0.5 | NA | NA | NA | NA | 0.23 | NA | NA | NA |
| SS-11 | Metal debris - beach | 4/24/2001 | 0.5 | 0.5 U | NA | 0.5 U | 0.5 U | NA | NA | 0.5 U | 0.757 |

Det level II SLVs (freshwater/aquatic)

0.009 0.0025

0.052 0.12

U - Not detected at noted reporting limit
 NA - Not analyzed

Table 4-1
Petroleum Hydrocarbon Concentrations in Removal Area Soil Samples
Crawford Street
All results in mg/kg

| Sample | Type | Gasoline | Diesel | Heavy Oil |
|--------|-----------|----------|--------|-----------|
| B-1 | Bottom | 22.2 U | 55.6 U | 111 U |
| B-2 | Bottom | 22.2 U | 55.6 U | 111 U |
| B-3 | Bottom | 25 U | 62.5 U | 125 U |
| B-3D | Bottom | 23.3 U | 58.1 U | 116 U |
| B-4 | Bottom | 22.5 U | 56.2 U | 112 U |
| B-5 | Bottom | 22 U | 54.9 U | 110 U |
| B-6 | Bottom | 21.7 U | 54.3 U | 109 U |
| B-7 | Bottom | 23.5 U | 53.4 | 179 |
| P-01 | Perimeter | 20.6 U | 51.5 U | 103 U |
| P-02 | Perimeter | 20.8 U | 52.1 U | 104 U |
| P-03 | Perimeter | 21.7 U | 54.3 U | 109 U |
| P-04 | Perimeter | 20.8 U | 52.1 U | 104 U |
| P-05 | Perimeter | 21.7 U | 21.7 U | 87 |
| P-06 | Perimeter | 20.4 U | 51 U | 102 U |
| P-07 | Perimeter | 20.2 U | 50.5 U | 101 U |
| P-07D | Perimeter | 20.4 U | 51 U | 102 U |
| P-08 | Perimeter | 20.2 U | 50.5 U | 101 U |
| P-09 | Perimeter | 21.5 U | 21.5 U | 53.8 U |
| P-10 | Perimeter | 20.4 U | 51 U | 102 U |
| P-11 | Perimeter | 21.3 U | 21.3 U | 56.9 |
| P-15 | Perimeter | 20.4 U | 51 U | 102 U |
| P-17 | Perimeter | 20.2 U | 50.5 U | 101 U |
| P-18 | Perimeter | 21.5 U | 53.8 U | 108 U |
| P-19 | Perimeter | 20.6 U | 30.1 | 68.6 |
| P-20 | Perimeter | 21.5 U | 53.8 U | 108 U |

U - Not detected at noted reporting limit

NA - Not analyzed

Table 4-2
PAHs Concentrations in Removal Area Soil Samples
Crawford Street
All results in mg/kg

| Sample | Type | Acenaphthene (L) | Acenaphthylene (L) | Anthracene (L) | Benzo(a)anthracene (H) | Benzo(b)pyrene (H) | Benzo(k)fluoranthene (H) | Benzo(g,h,i)perylene (H) | Benzo(k)fluoranthene (H) | Chrysene (H) | Dibenzo(a,h)anthracene (H) | Fluoranthene (H) | Fluorene (L) | Indeno(1,2,3-cd)pyrene (H) | Naphthalene (L) | Phenanthrene (L) | Pyrene (H) | LPAHs | HPAHs | Total PAHs |
|------------------------------------|-----------|------------------|--------------------|----------------|------------------------|--------------------|--------------------------|--------------------------|--------------------------|--------------|----------------------------|------------------|--------------|----------------------------|-----------------|------------------|------------|--------|--------|------------|
| B-1 | Bottom | 0.05 U | 0.05 U | 0.1 | 0.08 | 0.095 | 0.065 | 0.05 U | 0.1 | 0.12 | 0.05 U | 0.215 | 0.05 U | 0.05 U | 0.05 U | 0.18 | 0.205 | 0.38 | 0.96 | 1.34 |
| B-2 | Bottom | 0.05 U | 0.05 U | 0.05 | 0.07 | 0.095 | 0.06 | 0.095 | 0.09 | 0.11 | 0.05 U | 0.185 | 0.05 U | 0.055 | 0.05 U | 0.09 | 0.017 | 0.24 | 0.78 | 1.02 |
| B-3 | Bottom | 0.105 | 0.055 | 0.575 | 0.405 | 0.495 | 0.315 | 0.295 | 0.435 | 0.48 | 0.09 | 1.08 | 0.2 | 0.235 | 0.14 | 1.04 | 1.01 | 2.12 | 4.82 | 6.94 |
| B-3D | Bottom | 0.105 | 0.055 | 0.51 | 0.5 | 0.585 | 0.385 | 0.47 | 0.645 | 0.595 | 0.05 U | 1.21 | 0.17 | 0.35 | 0.09 | 1.04 | 1.54 | 1.98 | 6.31 | 8.29 |
| B-4 | Bottom | 0.095 | 0.055 | 0.445 | 0.435 | 0.525 | 0.37 | 0.345 | 0.485 | 0.545 | 0.1 | 1.04 | 0.17 | 0.275 | 0.085 | 0.925 | 1 | 1.78 | 5.12 | 6.90 |
| B-5 | Bottom | 0.075 | 0.05 U | 0.225 | 0.24 | 0.28 | 0.205 | 0.245 | 0.275 | 0.305 | 0.065 | 0.69 | 0.11 | 0.19 | 0.055 | 0.64 | 0.585 | 1.13 | 3.08 | 4.21 |
| B-6 | Bottom | 0.05 U | 0.05 U | 0.13 | 0.115 | 0.175 | 0.115 | 0.165 | 0.155 | 0.165 | 0.05 U | 0.265 | 0.05 U | 0.105 | 0.05 U | 0.205 | 0.28 | 0.44 | 1.57 | 2.00 |
| B-7 | Bottom | 0.05 U | 0.05 U | 0.05 | 0.08 | 0.135 | 0.09 | 0.165 | 0.105 | 0.12 | 0.05 U | 0.16 | 0.05 U | 0.1 | 0.05 U | 0.08 | 0.185 | 0.23 | 1.17 | 1.40 |
| P-01 | Perimeter | 0.05 U | 0.05 U | 0.05 U | 0.05 U | 0.05 U | 0.05 U | 0.05 U | 0.05 U | 0.05 U | 0.05 U | 0.065 | 0.05 U | 0.05 U | 0.05 U | 0.05 U | 0.07 | 0.15 | 0.34 | 0.49 |
| P-02 | Perimeter | 0.05 U | 0.05 U | 0.13 | 0.22 | 0.23 | 0.18 | 0.18 | 0.215 | 0.285 | 0.05 U | 0.605 | 0.05 U | 0.13 | 0.05 U | 0.46 | 0.515 | 0.69 | 2.59 | 3.28 |
| P-03 | Perimeter | 0.05 U | 0.05 U | 0.205 | 0.19 | 0.21 | 0.155 | 0.05 U | 0.23 | 0.26 | 0.05 U | 0.47 | 0.05 | 0.05 U | 0.05 U | 0.385 | 0.54 | 0.72 | 2.13 | 2.85 |
| P-04 | Perimeter | 0.05 U | 0.05 U | 0.05 U | 0.05 U | 0.05 U | 0.05 U | 0.05 U | 0.05 U | 0.05 U | 0.05 U | 0.05 U | 0.05 U | 0.05 U | 0.05 U | 0.05 U | 0.05 U | 0.05 U | 0.05 U | 0.05 U |
| P-05 | Perimeter | 0.05 U | 0.05 U | 0.18 | 0.085 | 0.08 | 0.055 | 0.05 U | 0.09 | 0.115 | 0.05 U | 0.25 | 0.05 U | 0.05 U | 0.05 U | 0.25 | 0.25 | 0.53 | 1.09 | 1.53 |
| P-06 | Perimeter | 0.05 U | 0.05 U | 0.05 U | 0.05 U | 0.05 U | 0.05 U | 0.05 U | 0.05 U | 0.05 U | 0.05 U | 0.07 | 0.05 U | 0.05 U | 0.05 U | 0.05 | 0.07 | 0.18 | 0.34 | 0.52 |
| P-07 | Perimeter | 0.05 U | 0.05 U | 0.05 U | 0.05 U | 0.05 U | 0.05 U | 0.05 U | 0.05 U | 0.05 U | 0.05 U | 0.05 | 0.05 U | 0.05 U | 0.05 U | 0.05 | 0.055 | 0.18 | 0.31 | 0.48 |
| P-07D | Perimeter | 0.05 U | 0.05 U | 0.05 U | 0.05 U | 0.05 U | 0.05 U | 0.05 U | 0.05 U | 0.05 U | 0.05 U | 0.065 | 0.05 U | 0.05 U | 0.05 U | 0.05 | 0.08 | 0.18 | 0.35 | 0.52 |
| P-08 | Perimeter | 0.05 U | 0.05 U | 0.05 U | 0.05 U | 0.05 U | 0.05 U | 0.05 U | 0.05 U | 0.05 | 0.05 U | 0.11 | 0.05 U | 0.05 U | 0.05 U | 0.09 | 0.115 | 0.22 | 0.45 | 0.67 |
| P-09 | Perimeter | 0.05 U | 0.05 U | 0.05 U | 0.05 U | 0.05 U | 0.05 U | 0.05 U | 0.05 U | 0.05 U | 0.05 U | 0.05 | 0.05 U | 0.05 U | 0.05 U | 0.05 U | 0.06 | 0.15 | 0.31 | 0.46 |
| P-10 | Perimeter | 0.05 U | 0.05 U | 0.05 U | 0.05 U | 0.05 U | 0.05 U | 0.05 U | 0.05 U | 0.05 U | 0.05 U | 0.05 U | 0.05 U | 0.05 U | 0.05 U | 0.05 U | 0.05 U | 0.05 U | 0.05 U | 0.05 U |
| P-11 | Perimeter | 0.05 U | 0.05 U | 0.07 | 0.075 | 0.14 | 0.11 | 0.05 U | 0.085 | 0.15 | 0.05 U | 0.195 | 0.05 U | 0.05 U | 0.05 U | 0.145 | 0.26 | 0.32 | 1.09 | 1.41 |
| P-15 | Perimeter | 0.05 U | 0.05 U | 0.21 | 0.11 | 0.115 | 0.07 | 0.05 U | 0.145 | 0.145 | 0.05 U | 0.31 | 0.065 | 0.05 U | 0.06 | 0.29 | 0.415 | 0.68 | 1.39 | 2.06 |
| P-17 | Perimeter | 0.05 U | 0.05 U | 0.05 U | 0.05 U | 0.05 U | 0.05 U | 0.06 U | 0.05 U | 0.05 U | 0.05 U | 0.065 | 0.05 U | 0.05 U | 0.05 U | 0.05 U | 0.08 | 0.15 | 0.35 | 0.50 |
| P-18 | Perimeter | 0.05 U | 0.05 U | 0.05 | 0.055 | 0.065 | 0.05 | 0.05 U | 0.085 | 0.075 | 0.05 U | 0.135 | 0.05 U | 0.05 U | 0.05 U | 0.085 | 0.16 | 0.24 | 0.70 | 0.94 |
| P-19 | Perimeter | 0.075 | 0.085 | 0.5 | 0.6 | 0.885 | 0.56 | 0.69 | 0.78 | 0.845 | 0.05 U | 1.49 | 0.15 | 0.47 | 0.095 | 0.795 | 2.06 | 1.70 | 8.41 | 10.11 |
| P-20 | Perimeter | 0.065 | 0.05 U | 0.16 | 0.195 | 0.275 | 0.21 | 0.275 | 0.285 | 0.245 | 0.05 U | 0.49 | 0.09 | 0.185 | 0.05 U | 0.475 | 0.57 | 0.84 | 2.76 | 3.60 |
| DEQ Sediment Screening Level Value | | 0.29 | 0.16 | 0.057 | 0.032 | 0.032 | | 0.3 | 0.027 | 0.057 | 0.033 | 0.111 | 0.077 | 0.017 | 0.176 | 0.042 | 0.053 | 0.078 | 0.193 | 1.61 |
| McDonald Consensus PECs | | | | 0.845 | 1.05 | 1.45 | | | | 1.29 | | 2.23 | 0.536 | | 0.561 | 1.17 | 1.52 | | | 22.8 |

U - Not detected at noted reporting limit
NA - Not analyzed

Table 4-3

PCB Concentrations in Removal Area Soil Samples

Crawford Street

All results in mg/kg

| Sample | Type | mg/kg |
|--------|-----------|--------|
| B-1 | Bottom | 0.05 U |
| B-2 | Bottom | 0.05 U |
| B-3 | Bottom | 0.05 U |
| B-3D | Bottom | 0.05 U |
| B-4 | Bottom | 0.05 U |
| B-5 | Bottom | 0.05 U |
| B-6 | Bottom | 0.05 U |
| B-7 | Bottom | 0.05 U |
| P-01 | Perimeter | 0.05 U |
| P-02 | Perimeter | 0.05 U |
| P-03 | Perimeter | 0.05 U |
| P-04 | Perimeter | 0.05 U |
| P-05 | Perimeter | 0.05 U |
| P-06 | Perimeter | 0.05 U |
| P-07 | Perimeter | 0.05 U |
| P-07D | Perimeter | 0.05 U |
| P-08 | Perimeter | 0.05 U |
| P-09 | Perimeter | 0.05 U |
| P-10 | Perimeter | 0.05 U |
| P-11 | Perimeter | 0.05 U |
| P-15 | Perimeter | 0.05 U |
| P-17 | Perimeter | 0.05 U |
| P-18 | Perimeter | 0.05 U |
| P-19 | Perimeter | 0.05 U |
| P-20 | Perimeter | 0.05 U |

| | |
|------------------------------------|-------|
| DEQ Sediment Screening Level Value | 0.034 |
| McDonald Consensus PECs | 0.676 |

U - Not detected at noted reporting limit

NA - Not analyzed

Table 4-4

Total Metals Concentrations in Removal Area Soil Samples

Crawford Street

All results in mg/kg

| Sample | Type | Chromium | Copper | Lead | Mercury | Nickel | Zinc |
|------------------------------------|-----------|----------|--------|------|---------|--------|------|
| B-1 | Bottom | 50.8 | 396 | 46.5 | 0.1 U | 28.1 | 152 |
| B-2 | Bottom | 75.9 | 558 | 1890 | 0.21 | 129 | 262 |
| B-3 | Bottom | 99.3 | 764 | 240 | 0.1 U | 44.4 | 282 |
| B-3D | Bottom | 100 | 968 | 84.6 | 0.12 | 67.3 | 384 |
| B-4 | Bottom | 139 | 1390 | 265 | 0.1 U | 72.8 | 302 |
| B-5 | Bottom | 144 | 1380 | 45.6 | 0.1 U | 104 | 246 |
| B-6 | Bottom | 79.2 | 1130 | 36.3 | 0.1 U | 54 | 183 |
| B-7 | Bottom | 33.2 | 292 | 30.6 | 0.1 U | 24.5 | 132 |
| P-01 | Perimeter | 104 | 745 | 20.5 | 0.1 U | 73.1 | 107 |
| P-02 | Perimeter | 92.7 | 760 | 48.3 | 0.1 U | 59.2 | 157 |
| P-03 | Perimeter | 137 | 1260 | 404 | 0.1 U | 75.9 | 279 |
| P-04 | Perimeter | 95.5 | 752 | 14.4 | 0.1 U | 34.6 | 94.7 |
| P-05 | Perimeter | 61.1 | 581 | 50.7 | 0.1 U | 26.9 | 139 |
| P-06 | Perimeter | 111 | 926 | 20.5 | 0.1 U | 50.2 | 102 |
| P-07 | Perimeter | 89.6 | 784 | 18.5 | 0.1 U | 43.7 | 111 |
| P-07D | Perimeter | 86.5 | 718 | 13.9 | 0.1 U | 34.9 | 106 |
| P-08 | Perimeter | 98.6 | 897 | 11.6 | 0.1 U | 33.4 | 98.6 |
| P-09 | Perimeter | 84.2 | 846 | 15.4 | 0.1 U | 34.1 | 103 |
| P-10 | Perimeter | 111 | 801 | 14.3 | 0.1 U | 58.3 | 101 |
| P-11 | Perimeter | 87.4 | 857 | 48.5 | 0.1 U | 37.6 | 111 |
| P-15 | Perimeter | 120 | 1240 | 26.1 | 0.1 U | 77.8 | 146 |
| P-17 | Perimeter | 116 | 1730 | 55.9 | 0.1 U | 144 | 167 |
| P-18 | Perimeter | 101 | 1200 | 3130 | 0.1 U | 285 | 314 |
| P-19 | Perimeter | 179 | 1890 | 656 | 0.1 U | 140 | 312 |
| P-20 | Perimeter | 142 | 1330 | 434 | 0.1 U | 50.8 | 269 |
| DEQ Sediment Screening Level Value | | 37 | 36 | 35 | 0.2 | 18 | 123 |
| McDonald Consensus PECs | | 111 | 149 | 128 | 1.06 | 48.6 | 459 |

U - Not detected at noted reporting limit

NA - Not analyzed

Table 4-5
TCLP Lead Concentrations in Removal Area Soil Samples
Crawford Street
All results in mg/l

| Sample | Type | TCLP Lead |
|--------|-----------|-----------|
| B-1 | Bottom | NA |
| B-2 | Bottom | 23 |
| B-3 | Bottom | 0.06 |
| B-3D | Bottom | NA |
| B-4 | Bottom | NA |
| B-5 | Bottom | NA |
| B-6 | Bottom | NA |
| B-7 | Bottom | NA |
| P-01 | Perimeter | NA |
| P-02 | Perimeter | NA |
| P-03 | Perimeter | 1.27 |
| P-04 | Perimeter | NA |
| P-05 | Perimeter | NA |
| P-06 | Perimeter | NA |
| P-07 | Perimeter | NA |
| P-07D | Perimeter | NA |
| P-08 | Perimeter | NA |
| P-09 | Perimeter | NA |
| P-10 | Perimeter | NA |
| P-11 | Perimeter | NA |
| P-15 | Perimeter | NA |
| P-17 | Perimeter | NA |
| P-18 | Perimeter | 3.9 |
| P-19 | Perimeter | NA |
| P-20 | Perimeter | NA |

U - Not detected at noted reporting limit
NA - Not analyzed

**SCHNITZER INVESTMENT CORP – KITTRIDGE DISTRIBUTION CENTER
CSM Site Summary**

SCHNITZER INVESTMENT CORP – KITTRIDGE DISTRIBUTION CENTER

Oregon DEQ ECSI #: 2442

4959 NW Front Avenue

DEQ Site Mgr: Rod Struck

Latitude: 45.5577°

Longitude: -122.7316°

Township/Range/Section: 1N/1E/19

River Mile: 8.6 West bank

LWG Member ☐ Yes ☒ No

Upland Analytical Data Status: ☐ Electronic Data Available ☒ Hardcopies only

1. SUMMARY OF POTENTIAL CONTAMINANT TRANSPORT PATHWAYS TO THE RIVER

The current understanding of the transport mechanism of contaminants from the uplands portions of the Schnitzer Investment Corp – Kittridge Distribution Center (Kittridge) site to the river is summarized in this section and Table 1, and supported in following sections.

1.1. Overland Transport

Stormwater runoff from the Kittridge site is directed to a series of catch basins equipped with sediment traps before being discharged into the City of Portland stormwater system. Over 90 percent of the site is either paved or covered with buildings. The small portion of the site that is not paved is covered with imported clean landscape fill. The site is 0.1 mile from the river. Sheet runoff is not currently a potential pathway of concern at this site. No historical information was located.

1.2. Riverbank Erosion

Not applicable. The site is not adjacent to the river.

1.3. Groundwater

The DEQ has indicated that, based on available data, it is unlikely that groundwater with elevated metals concentrations is migrating from the site to the Willamette River (DEQ 2004, pers. comm.). No information was available indicating that preferential pathways have been assessed at the site.

1.4. Direct Discharge (Overwater Activities and Stormwater/Wastewater Systems)

Stormwater from the site currently discharges to the Willamette River through City of Portland Outfall #19. Historically, there was a possible direct link from the site to the river through a drain channel at the cylinder testing area. The drain channel was used to collect water from the cylinder testing area and from water sprayed onto cylinders to keep them cool during the summer. This water then flowed into a drain line that terminated at the river (TETC 1990, Appendix F). DEQ (2004) reported that insufficient data are available to evaluate if historic stormwater discharges have impacted the Willamette River.

DO NOT QUOTE OR CITE.

This document currently under review by US EPA and its federal, state and tribal partners, and is subject to change in whole or part.

1.5. Relationship of Upland Sources to River Sediments

See Final CSM Update.

1.6. Sediment Transport

Not applicable. Site is not adjacent to the river.

2. CSM SITE SUMMARY REVISIONS

Date of Last Revision: August 31, 2005

3. PROJECT STATUS

| Activity | Date(s)/Comments |
|-------------------------------|--|
| PA/XPA | <input checked="" type="checkbox"/> PA/XPA equivalent (Bridgewater 2000) |
| RI | <input type="checkbox"/> |
| FS | <input type="checkbox"/> |
| Interim Action/Source Control | <input type="checkbox"/> |
| ROD | <input type="checkbox"/> |
| RD/RA | <input type="checkbox"/> |
| NFA | <input type="checkbox"/> |

DEQ Portland Harbor Site Ranking (Tier 1, 2, or 3): Tier 3

4. SITE OWNER HISTORY

Sources: Polk City of Portland directories, Sanborn fire insurance maps, DEQ (2004), TETEC (1991) for the period 1939-1991; Bridgewater (2000) for 1991-2000.

| Owner/Occupant | Type of Operation | Years |
|--|--|-------------------|
| Schnitzer Investment Corp. / Colour Systems, WorldCom, 04 Controls, Oregonian, Midwest Sign, Applied Industrial Technologies, Uniq Distributing. (owner/operators) | Storage, mixing, and distribution of oil-based inks; storage of trailer-mounted generators and large spools of cables and supplies for maintenance of telecommunication cables; newspaper machines, limited bearing cleaning with lube oil; distribution of household decorative tiles and tile installation supplies. | Unknown - present |
| (b) (6) (owner) | | 1999 - unknown |
| Crawford Street Corp /Asset Recovery (owner/operator) | Scrap metal handling and diesel truck refueling | 1991- 1996 |
| Northwest Airgas, Inc. / Chem Lime Corp. (owner/operator) | Some building demolition and partial site cleanup and remediation | 1987 - 1989 |
| Airco/Chem Lime Corp. (operator) | Industrial gas cylinder filling and distribution (argon, nitrogen, carbon dioxide, propane, ammonia, and methane) and lime recovery operations. | 1980s - unknown |
| Airco/Chem Lime Corp. (operator) | Acetylene production and lime recovery operations | 1975 -1985 |
| Airco (formerly ARPC)/Northern States Manufacturing and Materials (operator) | Acetylene production and lime recovery operations and wall board manufacturing | 1970 -1975 |

DO NOT QUOTE OR CITE.

This document currently under review by US EPA and its federal, state and tribal partners, and is subject to change in whole or part.

| Owner/Occupant | Type of Operation | Years |
|---|---|-------------------|
| Air Reduction Pacific Co. (ARPC) (operator) | Acetylene production | 1950 – circa 2000 |
| ARPC/Industrial Processing Co. (operator) | Acetylene production and lime recovery operations | 1960 - 1970 |
| ARPC/Industrial Raw Materials, Inc. (operator) | Acetylene production and lime recovery operations | 1950 - 1960 |
| City of Portland (owner) | | Unknown - 1942 |
| None (aerial photograph) | Undeveloped site | 1939 |

5. PROPERTY DESCRIPTION

Information on the property was obtained from Bridgewater (2000). The 4.95-acre site is located in an area known as the Guilds Lake Industrial Area. The property is located 0.1 miles south of the Willamette River (Figure 1). The Burlington Northern mainline railroad tracks are situated south of the site. To the west, a railroad spur is located adjacent to the site's property boundary and a Chevron asphalt refinery is located about 1,000 feet west of the site. Northwest Front Avenue is located along the northern property line and separates Tube Forgings, Lone Star, and Hampton sites (collectively referred to as the Front Avenue LLP properties) to the northwest, Shaver Transportation to the north, and Lakeside Industries to the northeast of the site. The NW Kittridge Avenue bridge structure is situated along the eastern boundary of the site.

The site lies above the 100-year Willamette River flood plain. The slope of the site area is generally flat. Over 90 percent of the ground surface at the site is paved or occupied by buildings. A brief history of the site's drainage system is given in Section 10.3.2.

The site has been used as a commercial and light industrial business park since 1996. The site is fenced, and the only access to the site is through the driveway off of NW Front Avenue. The business park consists of three concrete tilt-up buildings with flat roofs as shown in Supplemental Figure 2-1 from Bridgewater (2000). Building A, located in the northwest portion of the site, is occupied by Midwest Sign, Applied Industrial Technologies and Uniq Distributing. No floor drains were observed in this building. Building B, located in the northeastern portion of the site, is occupied by Colour Systems, WorldCom, and 04 Controls. No floor drains were observed in this building. Building C is located in the southern portion of the site and is occupied by *The Oregonian* newspaper. Two floor drains were observed near the compressors at this building (DEQ 2002).

There is no evidence of existing USTs (Bridgewater 2000). Two USTs were removed in 1989.

6. CURRENT SITE USE

The current site is owned by Schnitzer Investment Corporation (SIC) and is being used by seven independent industrial and commercial businesses, as shown in Supplemental Figure 2-1 from Bridgewater (2000).

Building A, located in the northwest portion of the site, is occupied by the following tenants:

- **Midwest Sign** receives and distributes printing and graphics supplies for a wide range of print media service providers. The facility stores, mixes, and distributes oil-based inks.
- **Applied Industrial Technologies** receives and distributes a wide range of small industrial parts, including belts, nuts, bolts, gaskets, and bearings. The site performs limited bearing cleaning with lube oil. Safety-Kleen regularly manages the wastes offsite. No floor drains were observed.
- **Uniq** receives and distributes household decorative tiles and tile installation supplies. No

DO NOT QUOTE OR CITE.

This document currently under review by US EPA and its federal, state and tribal partners, and is subject to change in whole or part.

Page 3 of 12

manufacturing and no materials are repackaged. No floor drains were observed.

Building B, located in the northeastern portion of the site, is occupied by the following tenants:

- **Colour Systems** receives and distributes inks to customers including printing companies. The facility mixes and repackages inks (mostly oil-based) to customer's specifications. Ink solvents (naphtha- and toluene-based) are also stored. About nine drums of waste ink and waste solvent are generated each month and disposed of offsite by Safety-Kleen contractors. No floor drains were observed.
- **WorldCom** space is used as a general storage of trailer-mounted generators, large spools of cables, and supplies for maintenance of telecommunication cables. No floor drains were observed.
- **04 Controls** distributes small electrical switching components. No equipment maintenance or assembly is performed. No floor drains were observed.

Building C is located in the southern portion of the site and is occupied by a single tenant:

- **The Oregonian** newspaper uses Building C to store and insert daily newspaper advertising pieces. The insert machines are operated using compressed air and are located on the northwest corner of the space. A 55-gallon drum of lube oil is stored near the air compressors. Water from the air compressors and floor-cleaning fluids drains into two floor drains that are connected to the City of Portland sewer system.

7. SITE USE HISTORY

Based on aerial photographs, the land now owned by SIC was vacant until approximately 1939 (TETC 1990). From 1942 to 1985, the site was used for acetylene production and lime recovery by Airco (formerly known as Air Reduction Pacific Co.), Industrial Raw Materials, Inc., and Chem Lime Corp. From 1970 to 1975, Northern States Manufacturing and Materials manufactured wallboard. In 1985, Airco ceased acetylene production and used the site only for industrial gas (argon, nitrogen, carbon dioxide, propane, ammonia, and methane) cylinder filling and distribution. Chem Lime Corp. continued lime recovery operations until 1987 (TETC 1990). In 1987, Northwest Airgas, Inc. acquired Airco. In 1989, Chem Lime ceased operations, and most of the lime sludge was removed from the facility. At the end of the same year, partial site cleanup and remediation occurred, including the demolition of the Chem Lime building and acetylene production plants (TETC 1991). In 1991, Crawford Street Corp purchased the site, and Asset Recovery used the site for scrap metal recycling (which included storing, processing and shipping metals) and diesel truck refueling until 1996. SIC purchased the site in 1996. The company performed an environmental site assessment and several remediation activities, which included the demolition of the old facilities and construction of current buildings (Bridgewater 2000). The site was redeveloped as a commercial and light industrial park (DEQ 2004).

The process used to produce acetylene involved reacting calcium carbide with water. In addition to acetylene, calcium hydroxide was produced as a byproduct. The calcium hydroxide byproduct was stored in lime lagoons, as shown in Supplemental Figure 2-4 of Bridgewater (2000). The large lagoon shown in this figure is approximately 220 ft by 150 ft and was 4 ft deep. The caustic lime was sold to farmers as soil amendment and to area-wide industries to buffer low pH solutions (DEQ 1999). Airco obtained a Waste Disposal Permit from DEQ in 1983 for the placement of the lime byproduct in the lagoon (Bridgewater 2000).

Two drain fields/septic systems were present between about 1942 and 1971, as shown in Supplemental Figure 2-4 from Bridgewater (2000). A dry well is reported to have existed onsite (DEQ 2004). Sewer service was provided to the property in 1971, though facilities were not connected until 1983 (DEQ 2004).

DO NOT QUOTE OR CITE.

This document currently under review by US EPA and its federal, state and tribal partners, and is subject to change in whole or part.

8. CURRENT AND HISTORIC SOURCES AND COPCS

The understanding of the historic and current potential upland and overwater sources at the site is summarized in Table 1. The following sections provide a brief discussion of the potential sources and COPCs at the site requiring additional discussion.

8.1. Uplands

Historic: Potential source areas are shown in Supplemental Figure 2-4 from Bridgewater (2000). The primary potential historical sources of contaminants at the site were releases associated with operations at the acetylene production and lime recovery areas (Bridgewater 2000, DEQ 2004).

Current: Currently, 90% of the site has been paved or developed. The exposed ground surface area has imported landscape fill. None of the current facilities onsite have operations that would be considered as having potential sources of contaminants to the river. In June 2004, DEQ determined that the site is not a likely current source of contamination to the Willamette River (DEQ 2004). DEQ (2004) also reported, "EPA agreed that this site does not appear to be a current source of contamination to the river."

8.2. Overwater Activities

☐ Yes ☒ No

The Kittridge site is not adjacent to the river.

8.3. Spills

No known or documented spills at Kittridge Distribution Center site were recorded from DEQ's Emergency Response Information System (ERIS) database for the period of 1995 to 2004, from oil and chemical spills recorded from 1982 to 2003 by the U.S. Coast Guard and the National Response Center's centralized federal database [see Appendix E of the Portland Harbor Work Plan (Integral et al. 2004)], from facility-specific technical reports, or from DEQ correspondence. TETC (1990) reported that two caustic spills (75 and 5 gallons) occurred at "Kittridge/Front Avenue." No further details about the spills were provided.

9. PHYSICAL SITE SETTING

Available information regarding the local geology and hydrogeology of the site is limited and was obtained from the Preliminary Assessment (PA) report (Bridgewater 2000). Subsurface investigation activities included the completion of five temporary monitoring wells (each completed to depths of approximately 15 feet bgs) and 11 probe borings at the site. Information regarding the depths of the probe borings was not available in the DEQ files.

9.1. Geology

According to the PA report, geologic materials under the site consist of Willamette River alluvial deposits that are underlain by basalt flows of the Columbia River Basalt Group (CRBG). Soils observed generally consist of fine sand and silty sand (Bridgewater 2000).

9.2. Hydrogeology

Shallow groundwater at the site is reported to be 10 to 15 feet bgs. The groundwater flow direction is inferred to be northerly, toward the Willamette River (Bridgewater 2000).

DO NOT QUOTE OR CITE.

This document currently under review by US EPA and its federal, state and tribal partners, and is subject to change in whole or part.

Page 5 of 12

CRAW00004878

10. NATURE AND EXTENT (*Current Understanding*)

The current understanding of the nature and extent of contamination for the uplands portions of the site is summarized in this section. When no data exist for a specific medium, a notation is made.

10.1. Soil

10.1.1. Upland Soil Investigations

☒ Yes ☐ No

Site investigations began in April 1989 with the characterization of material from the lime sludge lagoon and soil associated with the removal of two USTs used to store acetone and heating oil (TETC 1990). [The former locations of the USTs are shown in Supplemental Figure 2-4 from Bridgewater (2000).] In 1990, surface and near-surface soil samples were collected from potential source areas as part of the site assessment conducted by TETC (1990) [see Supplemental Figure D from TETC (1990)]. Finally, additional samples were collected in 1996 in conjunction with waste removal and remedial actions (Bridgewater 2000). Soil data from these investigations are summarized in Supplemental Table 2 from TETC (1990).

In summary, sludge from the lime ponds contained TPH and metals (chromium, lead, zinc). EP Toxicity concentrations of metals were less than the federal hazardous waste designation concentrations (Bridgewater 2000). Site soils contained detectable concentrations of metals, TPH, and PCBs (see Supplemental Table 2). Sludge and contaminated soils were subsequently removed (see Section 11).

DEQ (1999) noted that TETC attempted to collect soil from beneath the lime pond at six different locations. A hand auger could penetrate a hard black to gray layer of material but the backhoe could not. This layer was encountered in all six trenches, and it is presumed that the total aerial extent of this layer was not mapped.

Samples taken from oil-stained concrete near the compressors had PCBs ranging from undetected to 9.6 ppm. Sampling prior to disposal reported 0.077 to 0.24 mg/kg PCBs. The concrete was removed and disposed of offsite in 1996 (Bridgewater 2000).

10.1.2. Riverbank Samples

☐ Yes ☒ No

Not applicable.

10.1.3. Summary

Petroleum-contaminated soils have been removed from the site (Bridgewater 2000). Currently, over 90 % of the site is either paved or covered with buildings. The small portion of the site that is not paved is covered with imported clean landscape fill. Sheet runoff is not a potential transport pathway at this site.

10.2. Groundwater

10.2.1. Groundwater Investigations

☒ Yes ☐ No

In 1990, five temporary monitoring wells were completed to depths of 15 feet bgs (TETC 1990). Apparently, samples collected from the wells had high turbidity levels, which were attributed to a lack of a filterpack around the well screen or insufficient well development (Bridgewater 2000). The samples were analyzed for petroleum hydrocarbons, VOCs, and total metals. In 1996, groundwater samples were collected from 11 probe borings completed at the site. These groundwater samples were analyzed for dissolved metals (filtered in field) and VOCs.

DO NOT QUOTE OR CITE.

This document currently under review by US EPA and its federal, state and tribal partners, and is subject to change in whole or part.

10.2.2. **NAPL (Historic & Current)**

☐ Yes ☒ No

Available documents indicate that NAPL has not been observed at the site.

10.2.3. **Dissolved Contaminant Plumes**

☒ Yes ☐ No

Acetone and methyl isobutyl ketone (MIBK) were detected in a groundwater sample collected from one of the temporary wells completed in 1990. However, no VOCs were detected in any of the groundwater samples collected during the 1996 groundwater investigation. Arsenic, lead, and nickel were detected in filtered samples collected from the 1996 probe borings (Bridgewater 2000).

Plume Characterization Status ☐ Complete ☐ Incomplete

The DEQ has indicated that, based on available data, additional groundwater investigation is not warranted at this time (DEQ 2004, pers. comm.).

Plume Extent

Arsenic was detected in groundwater samples collected from three probe borings located in the northeast portion of the site. Lead was detected in a groundwater sample collected from the probe boring located along the east-central boundary of the site. Nickel was detected in groundwater samples collected from eight probe borings located throughout the site but at concentrations below applicable regulatory levels. Figure 2 shows the estimated extent of arsenic and lead in groundwater.

Min/Max Detections

Groundwater analytical data presented below are based on data collected during the 1990 and 1996 groundwater investigations (Bridgewater 2000).

| Analyte | Minimum Concentration (µg/L) | Maximum Concentration (µg/L) |
|---------------------------|------------------------------|------------------------------|
| <i>Metals (dissolved)</i> | | |
| Arsenic | <2 | 14* (350**) |
| Lead | <2 | 4* (340**) |
| Nickel | <5 | 7.3* (1200**) |
| <i>VOCs</i> | | |
| Acetone | <50 | 17,000*** |
| Methyl isobutyl ketone | <50 | 4,600*** |

* Samples collected in 1996.

** Samples collected in 1990 were significantly turbid.

*** Sample collected in 1990. Constituent not detected during 1996 groundwater investigation.

Current Plume Data

No current data are available. The most recent groundwater data were collected at the site in 1996.

Preferential Pathways

No information was available in the DEQ file to indicate that preferential pathways have been assessed at the site.

Downgradient Plume Monitoring Points (min/max detections)

No data are available. No monitoring points remain.

DO NOT QUOTE OR CITE.

This document currently under review by US EPA and its federal, state and tribal partners, and is subject to change in whole or part.

Visual Seep Sample Data

☐ Yes ☒ No

Not applicable. The site is not located adjacent to the river.

Nearshore Porewater Data

Not applicable. The site is not located adjacent to the river

Groundwater Plume Temporal Trend

Groundwater plume temporal trend data have not been collected.

10.2.4. Summary

Groundwater investigation activities conducted at the site included the completion of five temporary monitoring wells in 1990 and 11 probe borings in 1996. Acetone and MIBK were detected in a groundwater sample collected from one of the temporary wells but not in any of the probe borings. Arsenic, lead, and nickel were detected in groundwater samples collected from the probe borings. The DEQ has indicated that it is unlikely that groundwater with elevated metal concentrations is migrating from the site to the Willamette River and that, based on available data, additional investigation at the site is not warranted at this time (DEQ 2004).

10.3. Surface Water

The SIC - Kittridge stormwater system has been modified three times since operations began at the site in 1942.

A 1942 plumbing and drainage plan [TETC 1990, Appendix F; see Supplemental Figure 'A' from City of Portland (1942)] indicates that up to 1990 there was a direct link from the site to the river through a drain channel at the cylinder testing area. The drain channel was used to collect water from the cylinder testing area and from water sprayed onto cylinders to keep them cool during the summer, which then emptied into a wood flume whose termination was the river.

In 1984, the City issued a plumbing permit to Airco for the installation of five new catch basins in the vicinity of the cylinder refilling building (COP 1984). These catch basins conveyed stormwater runoff to a City of Portland storm line that discharges to the Willamette River at City Outfall 19.

In 1991, Asset Recovery paved much of the site and installed a stormwater collection system in the southern portion of the site. Catch basins located in paved areas are shown in Supplemental Figure 2-5 from Bridgewater (2000). Asset Recovery obtained a general NPDES 1200-R stormwater permit in September 1991. Monitoring was conducted up through 1995 when Asset Recovery ceased site activities.

Currently, stormwater at the site area either infiltrates into the ground or is collected in catch basins connected to the City of Portland storm sewer system that eventually discharges to the Willamette River at City Outfall 19 (Figure 1). In 1996, SIC demolished all buildings and constructed the three warehouses currently located on the property. The construction included installing a stormwater collection system that met City of Portland requirements (Bridgewater 2000).

10.3.1. Surface Water Investigation

☐ Yes ☒ No

DO NOT QUOTE OR CITE.

This document currently under review by US EPA and its federal, state and tribal partners, and is subject to change in whole or part.

10.3.2. General or Individual Stormwater Permit (Current or Past)

☒ Yes ☐ No

| Permit Type | File Number | Start Date | Outfalls | Volumes | Parameters/Frequency |
|-------------|-------------|------------|----------|---------|--|
| 1200-R | NA | 9/1991 | NA | NA | oil & grease, pH, and toxicity with semi-annual discharge monitoring for arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc. |

Do other non-stormwater wastes discharge to the system?

☐ Yes ☒ No

10.3.3. Stormwater Data

☒ Yes ☐ No

Asset Recovery sampled stormwater discharge at two points between 1993 and 1995 as required by DEQ under the NPDES 1200-R stormwater permit (DEQ 1999). Sampling locations were not available in DEQ (1999), but monitoring results were reported for four sampling events. Maximum detected metal and pH concentrations are as follows:

| Analyte | Maximum Concentration (mg/L) |
|--------------------|------------------------------|
| Arsenic | Not detected |
| Cadmium | 0.05 |
| Chromium | 0.06 |
| Copper | 0.68 |
| Lead | 0.60 |
| Mercury | 0.0079 |
| Nickel | 0.08 |
| Zinc | 2.1 |
| pH (dimensionless) | 8.72 |

10.3.4. Catch Basin Solids Data

☐ Yes ☒ No

Available records indicate that no catch basin solids data are available for the site.

10.3.5. Wastewater Permit

☐ Yes ☒ No

10.3.6. Wastewater Data

☐ Yes ☒ No

Available records indicate that no wastewater data are available for the site.

10.3.7. Summary

Currently, stormwater at the site area either infiltrates into the ground (approximately 10% of the site is pervious surface) or is collected in catch basins connected to the City of Portland storm sewer system that discharges to the Willamette River at City Outfall 19 (Figure 1). Historically, a 1942 plumbing and drainage plan [Supplemental Figure A from City of Portland (1942)] indicated that up to 1990 there was a direct link from the site to the river through a wood flume and a drain channel at the cylinder testing area.

DO NOT QUOTE OR CITE.

This document currently under review by US EPA and its federal, state and tribal partners, and is subject to change in whole or part.

10.4. Sediment

10.4.1. River Sediment Data

☒ Yes ☐ No

Historically, a portion of the Kittridge Site drained to the Willamette River via a wood flume. DEQ (2004) reported that insufficient data are available to evaluate if historic stormwater discharges have impacted the Willamette River.

10.4.2. Summary

See Final CSM Update.

11. CLEANUP HISTORY AND SOURCE CONTROL MEASURES

11.1. Soil Cleanup/Source Control

In 1989, two USTs used to store acetone and heating oil were removed from the site. Acetone was undetected (<0.2 ppm) in soil samples collected beneath the acetone tank, and TPH concentrations were below action levels (see Section 10.1) (TETC 1990).

In February 1990, farmers removed most of the sludge from the lagoon for use as soil amendment. Considerable residual lime was still evident in the surface soils as deep as 4 inches near the southwest part of the site (TETC 1990). The lagoon was filled and graded, and was not observed in 1995 aerial photos. Also in 1990, soil containing TPH was removed to a depth of 18 inches from a small area between the cylinder refilling room and the compressor room/paint shop [see Supplemental Figure D from TETC (1990)]. Investigations in 1996 found no evidence of petroleum hydrocarbons in this area (Bridgewater 2000).

In 1996, approximately 11 cubic yards of petroleum-contaminated surface soils were excavated and disposed of offsite. These soils were from the northwest corner of the site and north of the former Chem Lime building in the southwest corner of the site (Bridgewater 2000). Concrete stained with oil containing low levels of PCBs was disposed of as demolition waste (see Section 10.1).

11.2. Groundwater Cleanup/Source Control

No groundwater source controls have been conducted at the site.

11.3. Other

In 1991, Asset Recovery paved much of the site, installed a stormwater collection system with numerous catch basins and sediment traps as shown in Supplemental Figure 2-5 from Bridgewater (2000), and obtained a NPDES 1200-R stormwater permit (Bridgewater 2000).

In 1996, SIC demolished all structures on the site, installed a stormwater system meeting City of Portland requirements, performed additional paving, and constructed the existing three warehouses (Bridgewater 2000).

According to Bridgewater (2000), CH2M Hill performed several remedial activities on the site in April 1996, including removal of stained soils (see Section 11.1), concrete, and other waste debris. A lead concentration of 3.6 mg/L was detected in interior wall paint, and the material was disposed of as non-hazardous solid waste.

The septic tank was removed from the southeastern corner of the site, as shown in Supplemental Figure 2-4 from Bridgewater (2000). Approximately 69 gallons of emulsified oil and 139 gallons of oily solids from the tank were disposed of offsite. The tank was not connected to the stormwater system, and no evidence of soil contamination was observed in the soil surrounding the tank. City records indicate that the site has been connected to the public

DO NOT QUOTE OR CITE.

This document currently under review by US EPA and its federal, state and tribal partners, and is subject to change in whole or part.

Page 10 of 12

CRAW00004883

sewer system since at least 1961 (COP 1961).

11.4. Potential for Recontamination from Upland Sources

See Final CSM Update.

12. BIBLIOGRAPHY / INFORMATION SOURCES

References cited:

Bridgewater. 2000. Preliminary Assessment. Kittridge Distribution Center, 4959 NW Front Avenue, Portland, OR. Prepared for Schnitzer Investment Corp. Bridgewater Group, Inc., Portland, OR.

CH2M Hill. 1996. Environmental Site Assessment for 4959 N.W. Front Avenue, Portland, OR. Prepared for Schnitzer Investment Corp. and The Northwestern Mutual Life Insurance Company. CH2M Hill, Portland, OR.

COP. 1961. Bureau of Buildings, Report of Plumbing Inspection, Permit 105874. July 5, 1961. Accessed May 3, 2005.

COP. 1984. Bureau of Buildings, Report of Plumbing Inspection, Permit 503651. September 10, 1984. Accessed May 3, 2005.

DEQ. 2002. Personal communication (letter of October 3, 2002, from Rodney Struck, DEQ, to Tara Karamas of EPA Region X regarding Response to EPA Comments Schnitzer/Kittridge Source Control Decision). Oregon Department of Environmental Quality, Portland, OR.

DEQ. 2004. DEQ Site Summary Report – Details for Site ID 2442. DEQ Environmental Cleanup Site (ECSI) Database. Accessed December 7, 2004.
<http://www.deq.state.or.us/wmc/ecsi/ecsidetail.asp?seqnbr=2442>

DEQ. 2004. Personal communication (letter of June 8, 2004, from Rodney Struck, DEQ, to Tom Zelenka of Schnitzer Investment Corporation regarding Source Control Decision, Kittridge Distribution Center). Oregon Department of Environmental Quality, Portland, OR.

Integral, Windward, Kennedy/Jenks, Anchor, and Groundwater Solutions. 2004. Portland Harbor RI/FS Programmatic Work Plan. Final Report. Prepared for the Lower Willamette Group, Portland, OR. Integral Consulting Inc., Olympia, WA.

TETC. 1990. Report on an Environmental Site Assessment of Property Located at 4959 NW Front Avenue, Portland, OR. Prepared for Northwest Airgas, Inc. The Earth Technology Corporation, Long Beach, CA.

TETC. 1991. Summary Report for an Environmental Site Assessment and Remediation of Property Located at 4959 NW Front Avenue, Portland, OR. Prepared for Northwest Airgas, Inc. The Earth Technology Corporation, Long Beach, CA.

Figures:

Figure 1. Site Features

Figure 2. Extent of Impacted Groundwater

Tables:

Table 1. Potential Sources and Transport Pathways Assessment

DO NOT QUOTE OR CITE.

This document currently under review by US EPA and its federal, state and tribal partners, and is subject to change in whole or part.

Supplemental Figures:

- Figure 2-1. Current Site Plan. Kittridge Distribution Center (Bridgewater 2000)
- Figure 2-4. Site Plan 1991. Kittridge Distribution Center (Bridgewater 2000)
- Figure 2-5. Site Plan 1995. Kittridge Distribution Center (Bridgewater 2000)
- Figure D. Schematic Site Sketch of the Northwest Airgas, Inc. Property (TETC 1990)
- Figure A. Sewer in N.W. Front Avenue (City of Portland 1942)

Supplemental Tables:

- Table 2. Soil Chemical Concentrations at Schnitzer Investment Corporation – Kittridge Site (TETC 1990)

DO NOT QUOTE OR CITE.

This document currently under review by US EPA and its federal, state and tribal partners, and is subject to change in whole or part

Page 12 of 12

CRAW00004885

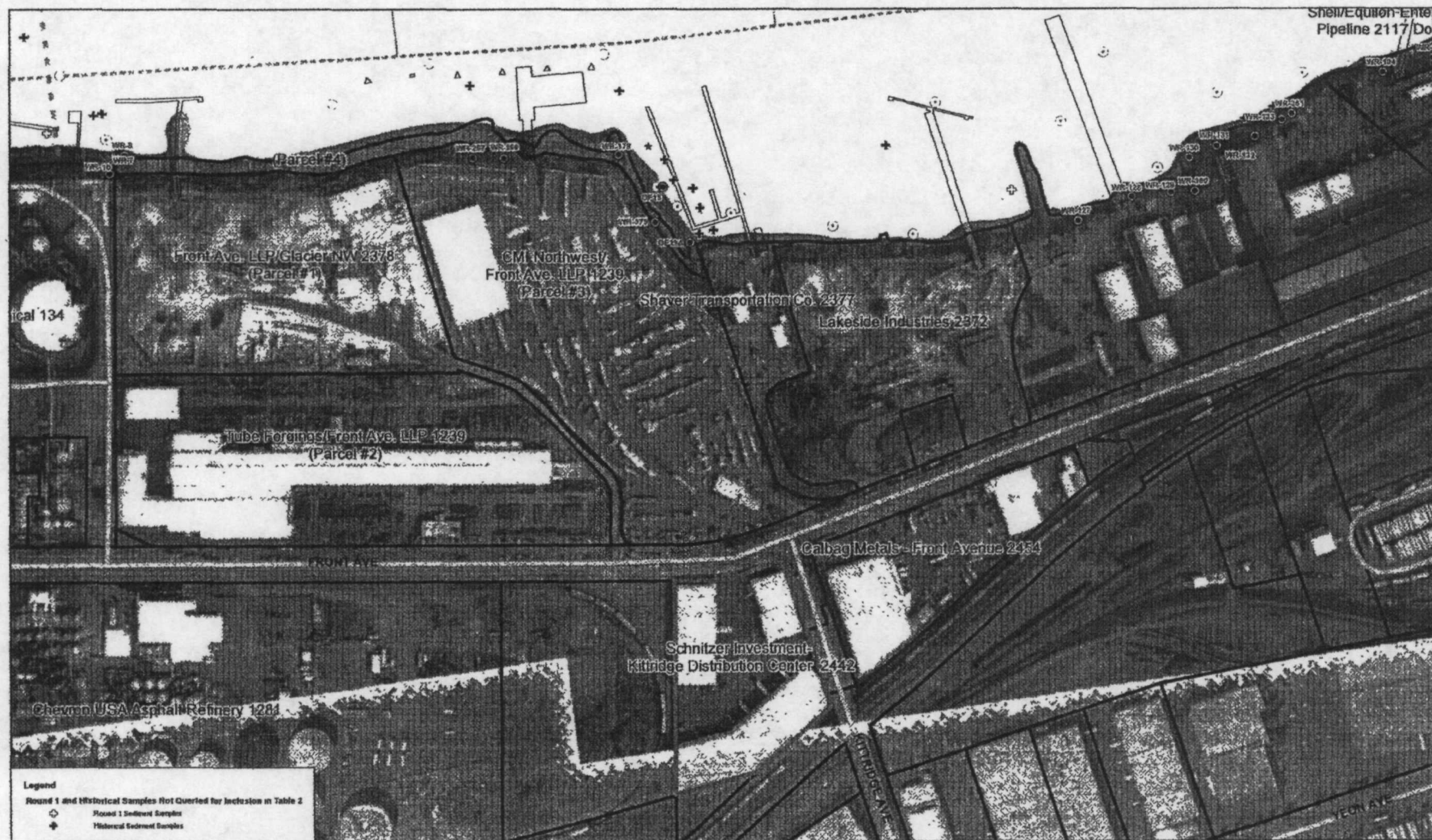
FIGURES

Figure 1. Site Features

Figure 2. Extent of Impacted Groundwater

DO NOT QUOTE OR CITE

This document is currently under review by US EPA and its federal, state, and tribal partners, and is subject to change in whole or in part.



Legend
 Round 1 and Historical Samples Not Queried for Injection in Table 2
 Placed 1 Sediment Sample
 Historical Sediment Samples

integral
 by

UWG

Map Document: E:\GIS\Projects\Portland_Harbor\UWG-Map-Project
 Constructing_2010_Maps\MapDocs\UWG_Map_Docs.mxd
 Plot Date: 2/22/2010

Aerial Photo Date: October 2001
 Date Map Features Were Published: 10/25

Outfall information contained on this map is accurate according to available records. However, the City of Portland makes no warranty, expressed or implied, as to the completeness or accuracy of the information published hereon.

Legend

Outfall
 Seaplane Location
 (Not location of actual Seaplane)
 Reduced OCSE Site Property Boundary
 Reimagined Channel

Dikes & In-water Structures: Flume Area

Ch. River Miles

OCSE Contour (1000 ft)

OCSE Contour (2000 ft)

OCSE Contour (3000 ft)

OCSE Contour (4000 ft)

OCSE Contour (5000 ft)

OCSE Contour (6000 ft)

OCSE Contour (7000 ft)

OCSE Contour (8000 ft)

OCSE Contour (9000 ft)

OCSE Contour (10000 ft)

OCSE Contour (11000 ft)

OCSE Contour (12000 ft)

OCSE Contour (13000 ft)

OCSE Contour (14000 ft)

OCSE Contour (15000 ft)

OCSE Contour (16000 ft)

OCSE Contour (17000 ft)

OCSE Contour (18000 ft)

OCSE Contour (19000 ft)

OCSE Contour (20000 ft)

OCSE Round 2 Proposed Sediment Samples

Surface Sample Only

Core & Surface Sample

Core & Surface Sample

Core & Surface Sample

Core & Surface Sample

Core & Surface Sample

Core & Surface Sample

Core & Surface Sample

Core & Surface Sample

Core & Surface Sample

Core & Surface Sample

Core & Surface Sample

Core & Surface Sample

Core & Surface Sample

Core & Surface Sample

Core & Surface Sample

Core & Surface Sample

Core & Surface Sample

Core & Surface Sample

Core & Surface Sample



0 50 100 200 Feet

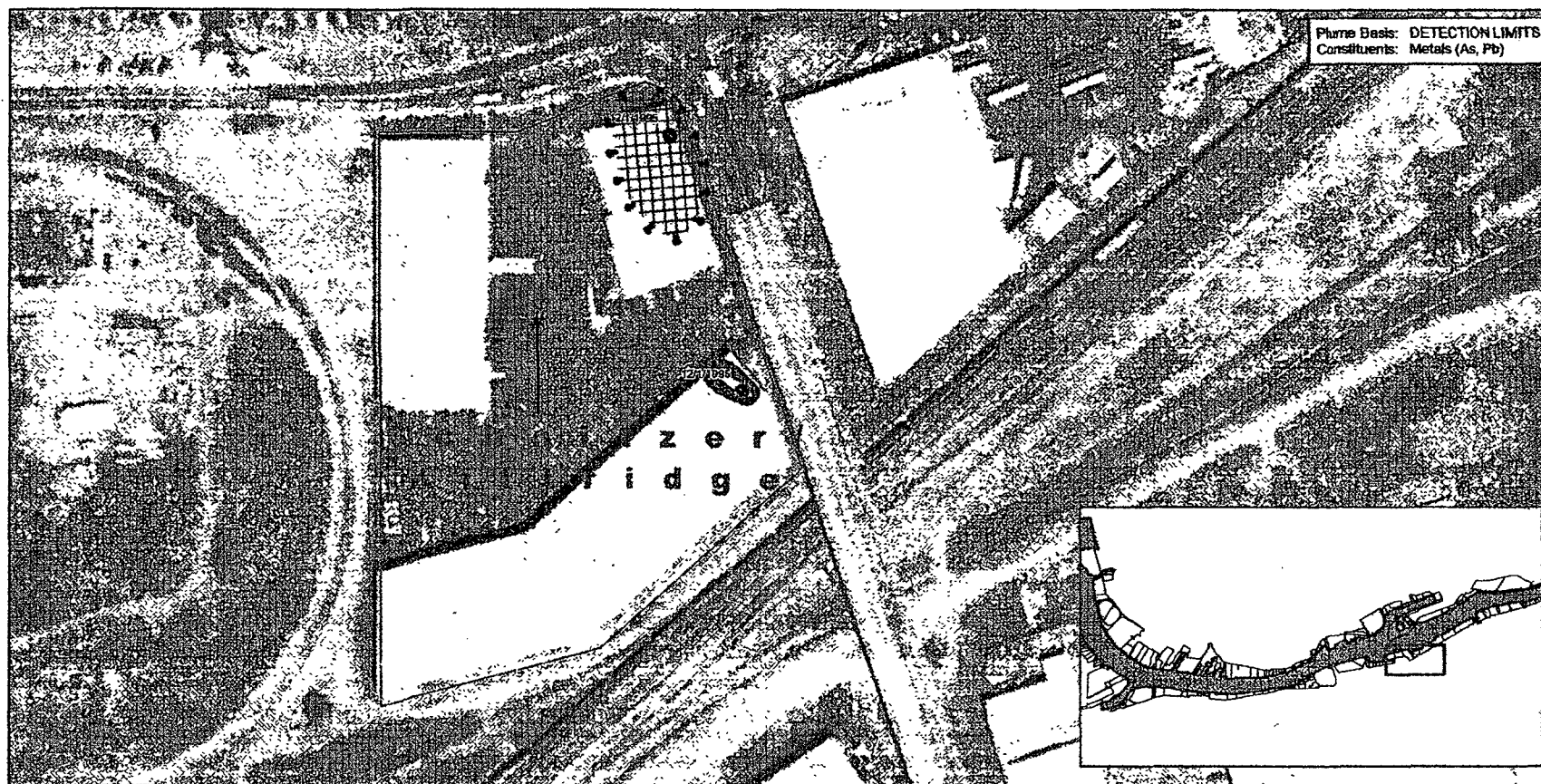
DRAFT

DO NOT QUOTE OR CITE. This document is currently under review by US EPA and is not for distribution outside of the project team.

Figure 1-Site Features
 Portland Harbor RI/FS
 Conceptual Site Model
 Schnitzer Investment-
 Kittridge Distribution Center
 ECST 2442

CRAW00004887

DRAFT



Plume Basis: DETECTION LIMITS
Constituents: Metals (As, Pb)

Groundwater Solutions Inc.

LWG
LOWER WILLAMETTE GROUP

0 75 150 Feet

FEATURE SOURCES:
Transportation, Water, Property, Zoning or Boundaries Metro RLIS.
ECST site locations were summarized in December, 2002
and January, 2003 from ODEQ ECST files

Map Creation Date Monday November 22, 2004

File Name: Fig2_SchmitzKit_SummaryMap.mxd

Legend

Site Boundary

Inferred Groundwater Flow

Contaminant Type
Metals (As, Pb)

Extent of impacted groundwater
For details, refer to plume interpretation
table in CSM document.

Single or isolated detection of COCs
Extent or continuity of impacted groundwater
between sample points is uncertain. Color based
on contaminant type.

Estimated extent of impacted groundwater area.
Color based on contaminant type.

Figure 2
Portland Harbor RI/FS
Schmitz/Kitbridge
Upland Groundwater Quality Overview

PRIVILEGED AND CONFIDENTIAL
Work product prepared in anticipation of litigation

DO NOT QUOTE OR CITE
This document is currently under review by US EPA
and its federal, state and tribal partners, and is subject
to change in whole or part

CRAW00004888

TABLES

Table 1. Potential Sources and Transport Pathways Assessment

DO NOT QUOTE OR CITE
This document is currently under review by US EPA and its federal, state, and
tribal partners, and is subject to change in whole or in part.

Schnitzer Investment - Kittridge Distribution Center #2442
Table 1 Potential Sources and Transport Pathways Assessment

| Potential Sources | Media Impacted | | | | | COIs | | | | | | | | | | | | | | | | Potential Complete Pathway | | | | |
|---|----------------|-----------------|-------------|--------------------|----------------|----------------|-----------------|-------------------------------|-------|------|------------|-----------|--------|------|---------------------------|----------------|-----------|--------------------------|--------------|--------------------|-------------|------------------------------|-------------------------------------|-------------------|------|------------------|
| Description of Potential Source | Surface Soil | Subsurface Soil | Groundwater | Catch Basin Solids | River Sediment | TPH | VOCs | | SVOCs | PAHs | Phthalates | Phenolics | Metals | PCBs | Herbicides and Pesticides | Dioxins/Furans | Butyltins | Calcium hydroxide (lime) | Bunker C oil | Overland Transport | Groundwater | Direct Discharge - Overwater | Direct Discharge - Storm/Wastewater | Riverbank Erosion | | |
| | | | | | | Diesel - Range | Heavier - Range | Petroleum-Related (e.g. BTEX) | | | | | | | | | | | | | | | | | VOCs | Chlorinated VOCs |
| Upland Areas | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Historical acetylene production and lime recovery | ✓ | ✓ | ✓ | | | | | ✓ | | ✓ | | | | | ✓ | | | ✓ | | | | | ✓ | | | |
| Overwater Areas | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Other Areas/Other Issues | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | |

Notes:

¹ All information provided in this table is referenced in the site summaries. If information is not available or inconclusive, a ? may be used, as appropriate. No new information is provided in this table.

✓ = Source, COI as present or current or historic pathway is determined to be complete or potentially complete.

? = There is not enough information to determine if source or COI is present or if pathway is complete.

Blank = Source, COI and Historic and Current pathways have been investigated and shown to be not present or incomplete.

UST = Underground storage Tank

AST = Above-ground Storage Tank

TPH = Total Petroleum Hydrocarbons

VOCs = Volatile Organic Compounds

SVOCs = Semi-volatile Organic Compounds

PAHs = Polycyclic aromatic hydrocarbons

BTEX = Benzene, toluene, ethylbenzene and xylenes

PCBs = Polychlorinated biphenols

DO NOT QUOTE OR CITE

This document is currently under review by US EPA

1 of 1

CRAW000004890

SUPPLEMENTAL FIGURES

- Figure 2-1. Current Site Plan. Kittridge Distribution Center (Bridgewater 2000)
- Figure 2-4. Site Plan 1991. Kittridge Distribution Center (Bridgewater 2000)
- Figure 2-5. Site Plan 1995. Kittridge Distribution Center (Bridgewater 2000)
- Figure D. Schematic Site Sketch of the Northwest Airgas, Inc. Property (TETC 1990)
- Figure A. Sewer in N.W. Front Avenue (City of Portland 1942)

DO NOT QUOTE OR CITE

This document is currently under review by US EPA and its federal, state, and tribal partners, and is subject to change in whole or in part.

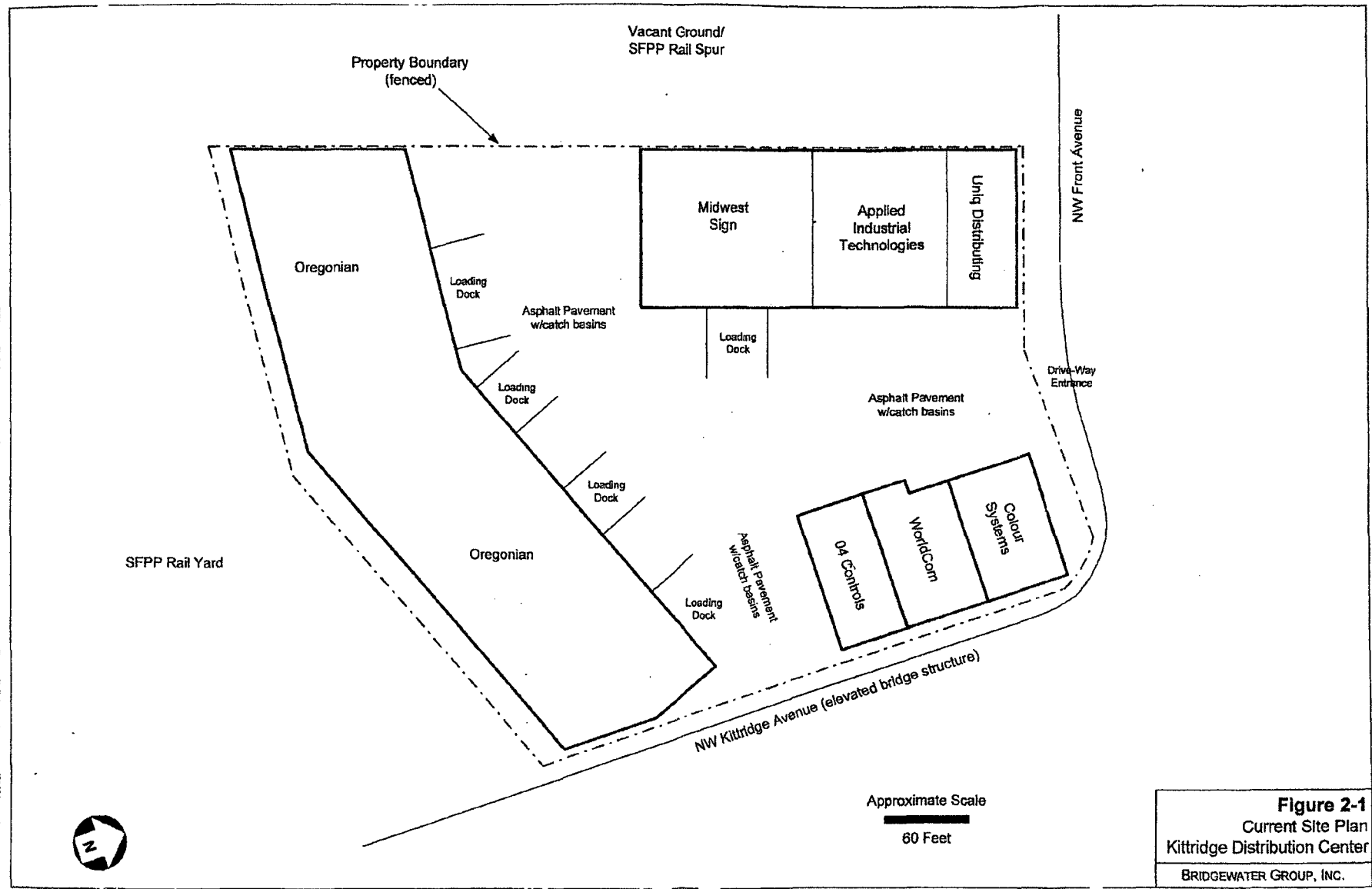


Figure 2-1
Current Site Plan
Kittridge Distribution Center
BRIDGEWATER GROUP, INC.

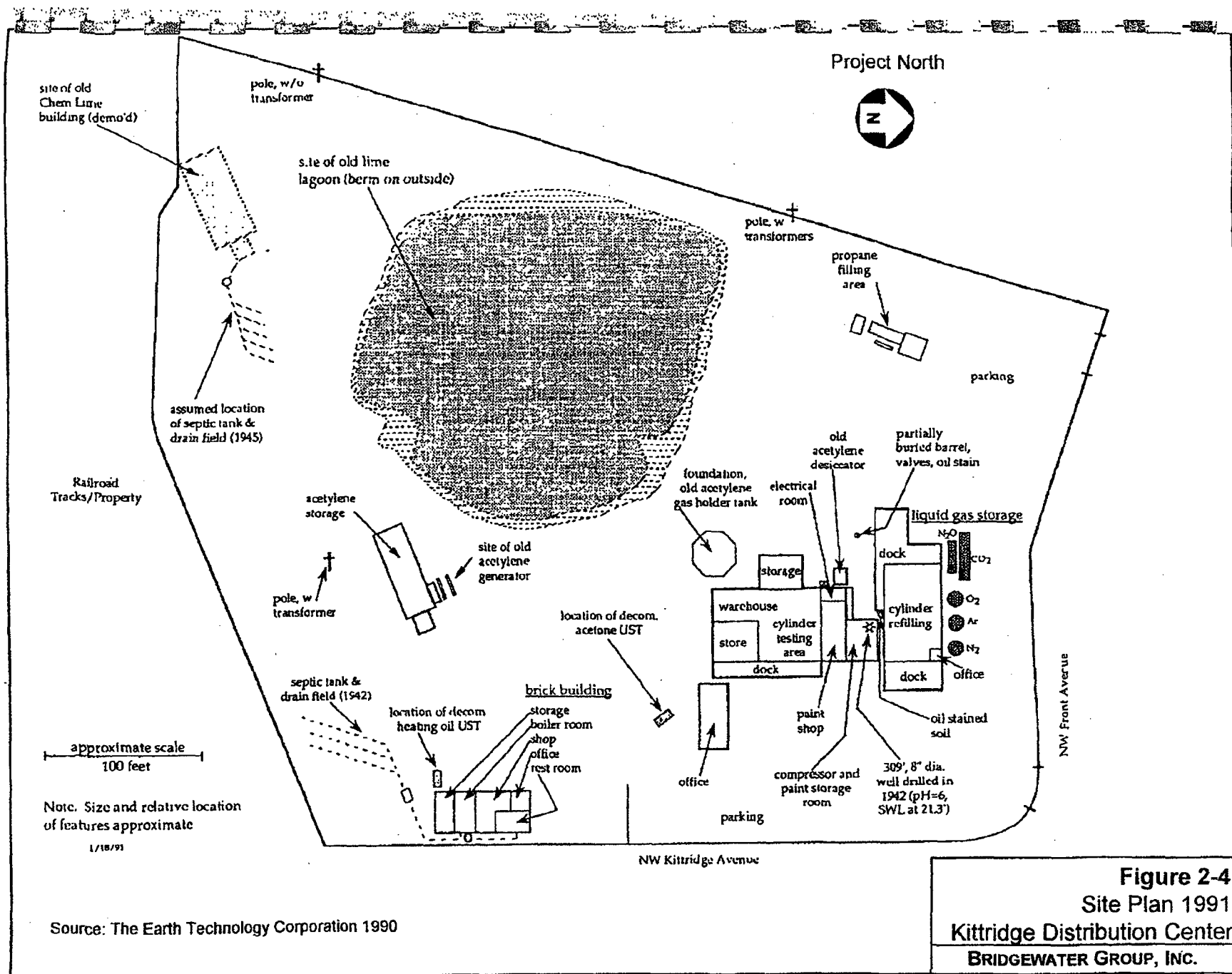


Figure 2-4
Site Plan 1991
Kittridge Distribution Center
BRIDGEWATER GROUP, INC.

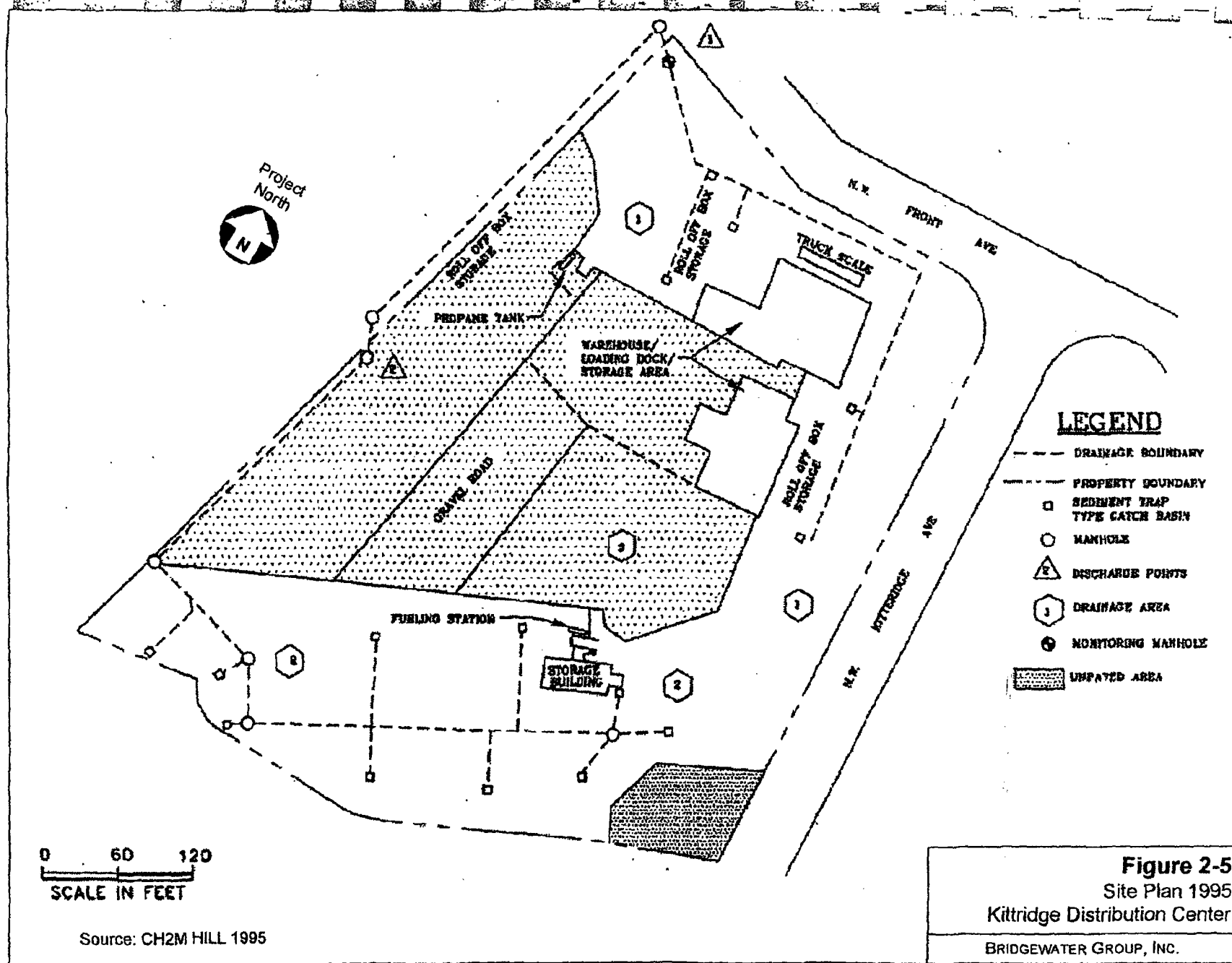
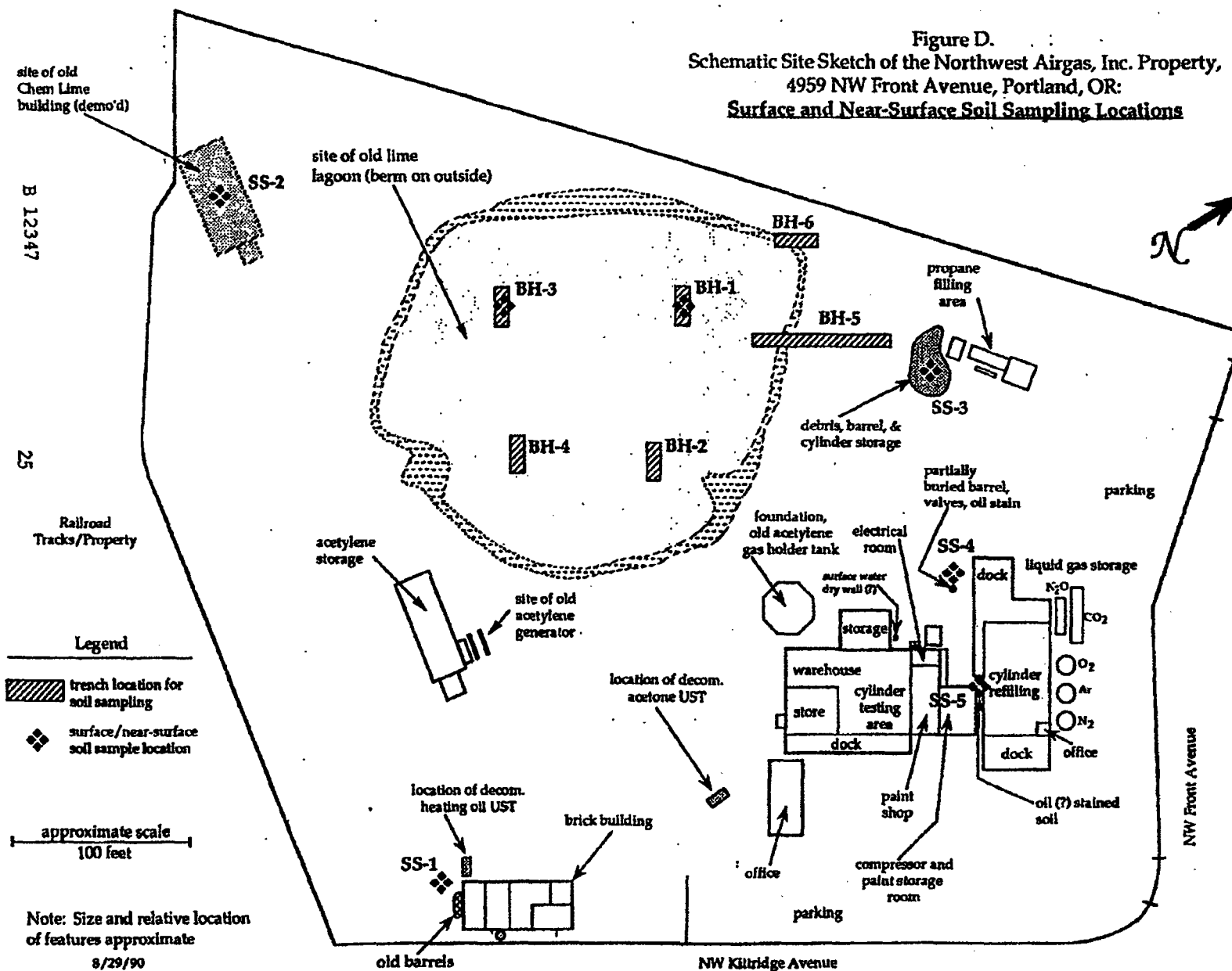


Figure D.
Schematic Site Sketch of the Northwest Airgas, Inc. Property,
4959 NW Front Avenue, Portland, OR:
Surface and Near-Surface Soil Sampling Locations



FINAL ESTIMATE

Name of Contractor Empire Const. Co.
 Contract Completed Dec. 15th 1942
 Kind of Pipe Cement Sewer Pipe
 Worked by L.F.S. Checked by M.A.
 Entered on Atlas by L.F.S. Checked by M.A.
 Entered on Atlas by L.F.S. Checked by M.A.

~~Prob. Est.~~
~~466 x 20 x 2.24 cu. yds.~~
~~10%~~
~~246~~

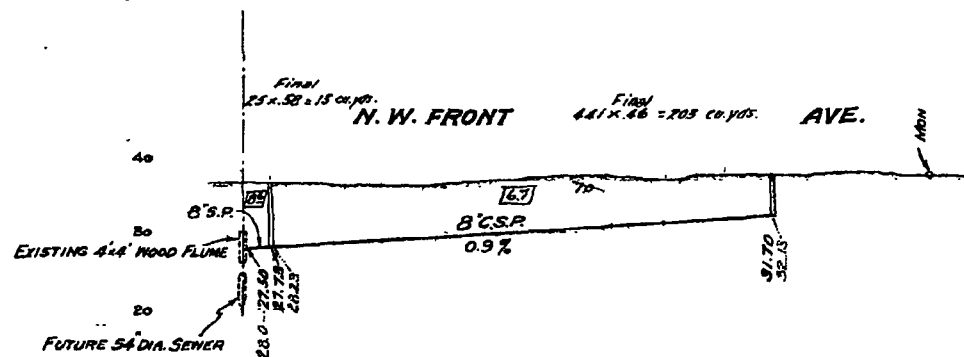
Final
 25 x 30 = 15 cu. yds.

N. W. FRONT

Final
 441 x .46 = 203 cu. yds.

AVE.

Total Final
 203 cu. yds.
 15
 218



SEWER IN
N.W. FRONT AVENUE
 PORTLAND ORE. OCT. 1942

BEN S. MORROW
 CITY ENGINEER

SCALE 1"=100'

EXHIBIT 'A'

APPROVED [Signature] DATE 10-13-42

Chief, Bureau of Construction
 Reg. Prof. Eng. No. 22, Nov. 1913

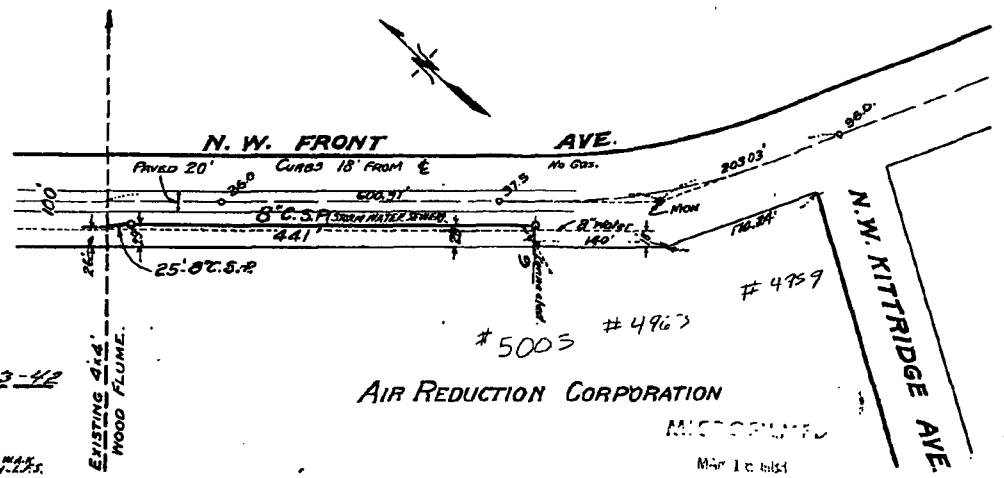
ORD. NO. 78028

PERMIT JOB

JOB NO. 1521

PET. NO. 192 1/4 SEC. 2524

Drawn: M.A.
 Checked: L.F.S.



AIR REDUCTION CORPORATION

MICROFILMED

Mar 10 1951

FILE
 V-63

CRAW00004896

SUPPLEMENTAL TABLES

Table 2. Soil Chemical Concentrations at Schnitzer Investment Corporation – Kittridge Site
(TETC 1990)

DO NOT QUOTE OR CITE
This document is currently under review by US EPA and its federal, state, and
tribal partners, and is subject to change in whole or in part.

Table 2. Soil Chemical Concentrations at Schnitzer Investment Corporation - Kittridge site (TETC 1990).

| Sample Type | Investigation Date | Chemical (mg/kg) ¹ | | | | | PCBs | Acetone | Comment |
|---|--------------------|-------------------------------|----------|----------|-------------|--------------------------|-----------------------|---------|---|
| | | Arsenic | Chromium | Lead | Zinc | TPH | | | |
| Sludge from lagoon (TETC 1990) | 1989 | --- | <10 - 37 | 10-400 | 120 - 3,100 | 409 (1 composite sample) | --- | --- | Sample from top 40 inches of sludge; pH 12.5 to 11.8 |
| Soil from UST excavations (TETC 1990) | 1989 | --- | --- | --- | --- | 100 - 190 | --- | <0.2 | TPH below DEQ cleanup standard of 500 ppm for Level 2 site (TETC 1990) |
| Soil - surface and nearsurface (TETC 1990) | 1990 | --- | --- | --- | --- | U - 2,600 | U | --- | 6 of 7 samples below DEQ cleanup standard for TPH, soils in this area subsequently removed |
| Soil - nearsurface (0 - 18") soil (TETC 1991) | | --- | --- | --- | --- | 2,800 | --- | --- | Soil removed but TPH at 2,800 mg/kg remained at bottom of excavation; later sampling by CH2M Hill (1996) did not observe any remaining contamination in this area |
| Soil and concrete (Bridgewater 2000) | 1996 | 16 - 28 | --- | 74 - 110 | --- | 1,700 - 2,800 | 1.8, 0.94 (2 samples) | --- | Two representative samples for waste disposal. VOCs and chlorinated pesticides undetected. Phenol = 9.9 mg/kg in 1 of 2 samples. |

¹Reported metals concentrations are for Total Metals.

U = undetected; detection limit not reported